THE

FOREST SYSTEM OF BRITISH BURMA:

A REPORT ADDRESSED TO
THE CHIEF COMMISSIONER OF BRITISH BURMA.

BY

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PREFATORY NOTE.

I HAD hoped that before this report came to be written, some steps would have been taken to provide a forest terminology in English. We cannot go on talking in cumbrous, explanatory circumlocutions of things which are every-day matters to a forester, nor can we interlard our writings with foreign words.

In the following report I have been compelled to make use of certain terms which foresters may hereafter consent to adopt generally, but which, at any rate, will, for the purposes of this report, be understood from the following explanation.

The term 'working-plan' is now pretty well known; and it is understood that in this phrase 'plan' does not mean a 'map,' but a 'scheme;' though of course maps accompany the working-plan. The names for the classes of forest, "high forest" (*hochwald; futaie*), "coppice under standards" (*mittel-wald; taillis-sous-futaies*), and "coppice" (*niederwald; taillis*) are also generally in use.

The term "taxator" describes the officer charged with the duty of drawing up the "working-plan".

I have further used the term "treatment" to signify the process of guiding and encouraging the growth of the forest we are cultivating. "Exploitation" is used for the working out of the produce of a forest, "material for exploitation" is consequently the timber, firewood, or whatever it is, that the forest has got to yield without touching on the capital.

"Direct utility" of a forest refers to its use in yielding wood, etc., for exploitation.

"Indirect utility" refers to the climatic or secondary uses of forest land.

Felling of timber is done in one of three ways. "Selection-felling" (*jardinage*; *plänterhieb*), or taking out of single trees one here and one there: this method of felling, in its worst possible form, is that hitherto adopted in India and Burma.

"Clear-felling" (*coupe á blanc-étoc*; *Räumungschlag*) is the complete clearance of a certain area or portion of forest destined for artificial reproduction.

Felling for natural reproduction (*methode de re-ensemencement naturel*) is conducted in three distinct series, spoken of collectively as the "serial cuttings" (*coupes de regénération*). One of these fellings, especially the first, may extend little by little over several years as its effect becomes apparent.

We have—

(1). The "preparatory cutting" (*vorbereitungs-schlag; coupe d' ensemencement*)—cuttings to enable the soil to prepare itself, and for the seed to fall and germinate evenly over the whole area treated.

(2). The "light or secondary cuttings" (*licht schlag; coupe sécondaire*) follow, to admit, as the name implies, more light into the forest, and to strengthen and bring on the young plants as well as remove badly formed trees.

(3). The "definitive cutting" (*coupe definitive; reiner abtrieb, &c.*) is the final cutting out of all the mature material, the forest being now re-stocked by the young growth which has sprung up under the treatment by fellings Nos. 1 and 2.

Further innovation I have not attempted, but there are numerous other phrases and terms that will ere long need to be made at home in English.

Such other terms as may be used in the report, but are not here explained are so sufficiently, either by text or context, where they stand.

I take this opportunity of thanking the officers of the Forest Department in Burma for the assistance given me in preparing this report, and in making inspections; especially my acknowledgments are due to CAPTAIN SEATON the Conservator, to MR. J. K. HUME and to MR. M. H. FERRARS, Assistant Conservators.

B. H. BADEN-POWELL, B. C. S.

Offg. Inspector General of Forests.

RANGOON,
The 18th September 1873.

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REPORT ON THE FOREST SYSTEM OF BRITISH BURMA.

PART I.—GENERAL.

It is necessary to begin with a general idea of British Burma from a forest point of view;—to look at the chess-board before we deal with the moves and the men. This is the 'General' part of my report. This part will of course be superfluous for Burman officials, but is essential to other forest officers and to the Government to which I am reporting, to explain the proposals which follow in the 'Special' part.

Importance of the forests.

2. A glance at the position of the forests, and the export lines of the great rivers, makes us realize at once how admirably adapted Burma is for timber trade and export; and not only so, but of what vital importance the forests are to the welfare of the Province. I never saw a country which exhibits so remarkably the climatic value of forests, or enables one to understand what will happen, and happen too at no very distant date, if a mistaken policy, or, worse than all, an indifference to the subject, causes us to neglect to take steps *in time* for arriving at a knowledge of the area of forest which ought to be saved while population is spreading.

Example of India.

3. In India, we waited to preserve our forests till two-thirds of the material had perished, perhaps, beyond recall: in Burma *now*, the material is (comparatively speaking) abundant, and the work before us easy. I expressly qualify, however, the term abundant; all jungle is not forest, nor useful as such; and in a country with much *waste land* it is easy to be misled by indistinct and vague ideas, and to talk of an "inexhaustible supply" and so forth, and thus to put off the day for considering the constitution of the permanent forest lands and their distribution.

Present supposed abundance of forests calculated to mislead.

4. People who do not want the trouble of thinking and working out the problem, satisfy themselves readily that there are grounds for security in the present condition of things; they talk about the importance of conciliating settlers and increasing the facilities for population, forgetting that it is quite possible to bear in mind to the fullest extent this all-important consideration, without neglecting the other, and that having got the population, it will be miserably off if there is no forest to supply its wants.

Necessity for taking steps towards keeping district forests.

5. As to Forest Departmental reservation for forest purposes, there is no question about that: the timber trade is too extensive to make it possible to ignore its claims; but I beg strongly to urge that the question of arranging for district forests (in the extended sense that I afterwards attach to the term) should be taken up also; at any rate that the *first steps* should be taken, steps which can be taken now with ease, but which a few years hence may be attended with difficulty and even danger. Having raised the warning, I can do no more.

General position of the forests.

6. To give a general idea of the 'situation' from a forest point of view, it will be enough to observe that we have to deal with a country which extends in a compact block from the crest of the Arrakan Yoma (I exclude the Arrakan province beyond) on the west, to the vast series of hills that lie beyond the Sittang, and extend up to the Salween river on the east. But from the point where the Thoungyeen joins the Salween, a sort of tail-piece is added on, embracing the valley of the Salween (below the junction alluded to), and running away down south to form the valley of the Attaran river and other districts in the province of Tenasserim.

7. We can represent the whole outline of the country for the purpose of understanding its forest and climatic features by such a sketch as shewn opposite.

The forest of the lower portion of Burma.

8. Disposing first of the lower part of the province, if a straight line be drawn from Martaban to Bassein, all below it will represent a vast plain sparsely populated, low-lying, intersected with tidal creeks, and covered mostly with jungle loving the salt or brackish moisture of the locality. At the sea margin of this tract, alluvial deposit and sand are being unceasingly thrown down, forming the 'delta' of the great rivers. Here the mangrove (*Avicennia sp.*) abounds,

The mangrove jungles of the delta.

and occasionally the *nipa* palm. The resources of these mangrove jungles are already being taxed for fuel. Ere long, with the inevitable extension of Rangoon as the trade capital, the demand will become greater. It is by no means too early to take the matter into consideration and see what these tracts of country intersected with creeks yield. The *Avicennia* reproduces itself by strong pointed shoots which come up from the subterranean roots.

Further inland, beyond the influence of the tidal creeks, and where paddy cultivation becomes possible, the plain is covered with coarse, tall grass, interspersed with trees of the pyimmá (*Lagerstræmia*), *Butea frondosa* (Pouk), and *Bombax* (Lepán); where there is forest it is void of teak, and has these species and also (Yindeik) *Dalbergia*, *Nauclea parviflora*, and others.

The lie of the country in the upper portion.

9. Viewing, next, the upper portion of the province, we see a very simple disposition of physical features. We have alternate mountain ranges and rivers with their level valleys. First, the Arrakan Yoma; then the Irrawaddy valley shut in on the other side by the Pegu Yoma. Crossing this we have the Sittoung or Sittang valley and then the vast mass of hills that form the Salween watershed; the Salween itself forms the boundary below the Pahchoung stream.

10. Let us now glance at the rivers and mountain ranges as they follow in succession. The main rivers, the Irrawaddy and the Salween, are big streams when they enter our territory; the Sittoung is much smaller, but all are in no slight degree dependent on, or rather, liable to be influenced by, the feeders which come from the hill ranges on either side.

The Irrawaddy River.

11. For a considerable portion of its course the Irrawaddy is protected, so to speak, from the direct influence of the hill streams by the Hline river which intervenes on the east. The Bassein river on the west side occupies a somewhat similar position.

The Yoma mountains.

12. The central or Pegu Yoma tails off gradually towards Rangoon, and serves as the watershed between the Hline and the Pegu rivers, which, uniting with other streams, flow out below Rangoon.

The Sittang.

The Sittang receives the drainage of the hills on both sides.

The forests to east and south of the Sittang.

13. When once we enter the vast network of hills beyond the Sittang, we have the forest valley of the Yoonzaleen, and below, the valleys of the Beeling, the Domdamee, the Hlineboay, and the Lower Thoungyeen. The Beeling flows into the sea, the Domdamee into the Salween; so also the Hlineboay.

The southern most forest rivers are the Houndraw and the Attaran, which run in a direction south to north, and meet the Salween.

Distribution of mountain and plain.

14. The relative distribution of mountains and level ground will appear from the following table (all in square miles). The Amherst district, also Tavoy and Mergui, it is not possible to estimate from the data.* Tavoy has a considerable area of plain land available for cultivation.

District.	Mountain and elevated lands.	Plains.	Total.
Rangoon ...	The Yoma, 90 miles by 5 broad, except in the southern extremity, say 450 square miles.	Cultivated ... 774 Culturable ... 7,798 Waste ... 778	9,800
Bassein ...	The Arrakan Yoma on the western side only.	Whole northern part of district as far south as Gna-poo-taw, also the delta ...	8,954
Myanoung ...	1,200 square miles ...	(*a.*) Plains between Hline river and the Yoma ... 900 (*b.*) Plains between Hline and Irrawaddy, liable to inundation ... 200 (*c.*) On western bank of Irrawaddy ... 1,740 (Area of rivers, etc., not included) Irrawaddy is about one mile broad through whole length of district.	4,150
Prome ...	1,186 ...	775 (*i. e.*) cultivated lands more or less level ...	2,225
Thayetmyo ...	2,100 ...	400 ...	2,500
Toungoo ...	6,000 ...	300; add Sittang river bed, etc. ...	6,354
Shwegyeen ...	6,900 ...	1,038 331 marsh, lake, and river bed. (2,000 other) ...	10,272

* Administration Report of British Burma, 1871-72.

15. The geological formation of the country is soon told in a very general way sufficient for the purpose. The Arrakan Yoma is of tertiary formation, with much limestone (Eocene period); in the highest portions of the range above the tertiary strata, granite, and its varieties, appear. In the north among the tertiary beds are petroleum-yielding strata, and beds containing coal, which, like all tertiary coals of that age in the Indian Empire, prove worthless. Geological formation. Arrakan Yoma.

16. The valley of the Irrawaddy is of rich alluvial soil,* mainly due to the detritus of tertiary sandstones and marls. Valley of the Irrawaddy.

17. The Pegu Yoma consists of vast tertiary beds of sandstones, shales and marl, great variety in color being observed in places. Over the marls, especially towards the plains or subsidence of the lower ranges, indurated vesicular beds of iron-sand and clay abound; these are usually called laterite. The Pegu Yoma.

"Laterite" is however not a geological term, but rather, if it is a term at all, a mineralogical one, applied to many varieties of rock, *e. g.*, the laterites of Central and Western India, which bear no resemblance to the so-called laterite of Burma. Laterite.

18. The laterite on both sides of the Yoma simply consists of tertiary sandstone or clay, indurated with much concretionary peroxide of iron, causing it to assume a vesicular appearance, especially on exposed surfaces, when the softer portions have been removed by action of water or the weather. Towards Prome the laterite is so abundant in iron as formerly to have been worked for ore. Mineral structure of the laterite.

19. Towards the northern part of the Yoma, in the Prome district, fossiliferous beds full of shells abound, and beds containing silicified wood; also bituminous shales and sandstones yielding petroleum.

20. On the Sittang side, in the north-east, we find boulders of much disintegrated granite among the laterite and tertiary strata. And on approaching the higher hills, among which Nattoung is conspicuous, we have slate with metamorphic and plutonic rock, together with the out-crop of the carboniferous limestone which forms a range running north-east and south-west, and is again conspicuous at Maulmain. The Sittang valley soil is alluvial and more open, having a larger admixture of the detritus of the primary rocks, quartz and sand, etc. Sittang side of the Prome Yoma. Sittang Valley.

21. The southern part of Tenasserim contains stratified sandstone and laterite, and the plutonic rocks below; these begin to appear at Amherst, and form the main feature of the hills southward; the eastern or inland slopes having slate and other metamorphic rock. Tenasserim.

22. The laterite beds form everywhere so conspicuous a feature that they require a further notice. Distribution of laterite.

In the large map which accompanies this report, the laterite is indicated by a lilac tint. It will be found to skirt the Arrakan Yoma towards the centre, and to form a very remarkable belt all along the Pegu Yoma on its western side, following the range round at its terminus above Rangoon. The great mass of the long and intricate system of spurs, which spring from the Yoma on the Sittang side, are also frequently terminated by, or interspersed near their subsidence with, laterite.

The hill ranges which form the Salween watershed also exhibit some laterite near the river on the eastern side, and the laterite bed is especially well marked and continues along the eastern edge of the ranges skirting the Thoungyeen river.

23. The distribution of the forest may now be glanced at.

The vegetation of the laterite tracts I have just described is peculiar, and the forests on them will demand particular attention. All along the Arrakan Yoma, and on both sides of the Pegu Yoma, the Eng (*Dipterocarpus tuberculata, D. grandiflora. Wall.*) is the prevailing tree, sometimes intermixed with thitsi (*Melanorhœa*), also with a species of *Shorea* (Theiya), *not* the Bengal saul, and Eng-jyin, *called*, but I think wrongly, *Hopea suava* (*Wall.*) Distribution of forest. Forest on the laterite.

The soil is hard or else with a layer of loose sand, and poor, and the Eng, though a very slow grower, is the only tree that takes to the soil, and so gets the upper hand. The undergrowth is a sparse thin grass, occasionally a small

* The alluvial plains when uncultivated, do not always contain forest; but often there are large tracts of coarse "thekkay" or thatching grass, and "kaing" or elephant grass, especially near streams.

dry palm,—a species of *Elate*, is found, and a cycad (mungdain) *Cycas terminalis*. Directly a depression occurs, or a place where, from water action or other cause, a little soil collects, the traveller will note a change in the forest, bamboos, teak, and other trees appearing.

The pines (*P. Masoniana*) near the Thoungyeen, on the southern portion, also grow upon laterite.

"Lower mixed forest."

The forest that lies plain-ward of the Engdain (though this sort of forest is often found on the other side also, at the foot of the lower hills) is called the "Lower mixed forest;" it contains *Lagerstræmia* (Pyimma), *Albizzia elata* (Seet), *Bombax* (Leppán), *Yendeik* (Dalbergia), *Nauclea sp.* (teinthay), *Dipterocarpus alata* (Kanyen), *Dillenia aurea* (Zimjoon,) *Careya* (Bambway,) *Schleichera* (Jyoben), *Meliusa velutina* (Tabookgyee), *Homalium tomentosum*, and other species.

Teak forest.

24. The chief teak forests (colored *light* green in the map) avoid the proximity of the sea, and occupy more or less the whole of the hills on the east face of the Arrakan Yoma, and both slopes of the Pegu Yoma, and extend also to the hills of the Yoonzaleen, Thoungyeen, Salween, Hlineboay, Houndraw, and Attaran rivers.

Forest below Attaran.

25. Below the Attaran valley teak does not appear to extend; and the Tenasserim lower forests produce Pyimma (*Lagerstræmia*), Iron wood, species of *Hopea* (Thingán), and Kanyen (wood-oil tree): abundantly also the sappan wood (*Cæsalpinia sappan*)—a wood used for dyeing red or pink, and much exported to Calcutta.

Good drainage required for teak

26. The teak is scattered (as we shall presently see): it avoids all low-lying places, all tracts of heavy clay liable to frequent and long-continued inundation, and delights in undulating grounds and slopes which have moisture, but at the same time a moderately open soil with a fair admixture of sand, and have good drainage.

Teak lives in rather dry places, but has no objection to moisture, as it always follows the streams, but then there is *drainage*.

The different classes of teak forest are so well described by Mr. Brandis in his Attaran report (Sel. Rec., Government of India, No. XXXII, page 51) that a detailed repetition would here be superfluous, but a re-cast in a brief tabular form will not, perhaps, be without value.

Classification of Teak Forest.

Group.	Position.	Soil.	Trees accompanying.	Undergrowth.	Shade in hot season.	Fires.
1	Level below hills or in valleys near higher hills as Beeling (Martaban.)	Moist, good ...	All sorts; *Lagerstræmia dillenia, bignonia, etc., etc., etc.*, and bamboos.	*Musa, zingiber, curcuma, globba*, and acanthaceous flowering plants.	Always ...	Not regular; not dangerous.
2	Lower undulating hills ...	Moist, good ...	Bamboos in clumps, *xylia, pterocarpus, albizzia, terminalias, Dillenia speciosa, hibiscus, bombax, eriodendron, & pentaptera.*	*Pollinia* or teak grass (dries and becomes inflammable).	Some ...	Regular.
3	Ditto ...	Poor and drier ...	Mírwá bamboo (*B. stricta*), *hibiscus, xylia, terminalia, etc.*	Little or none	None ...	Regular, but sparse undergrowth renders them light.
4	Higher hills	Slopes, with good soil.	Evergreen bamboos, *xylia, Homalium pentaptera.*	Rather sparse: in places, acanthaceous plants, *baliospermum*, etc., and grass.	Some ...	Occasional only, and not very destructive.

Evergreen forest; its distribution.

27. The higher parts of the Arrakan Yoma have dense evergreen forest, but this occurs both here and on the Salween side on the primary rock and limestone formations, not on the tertiary sandstone. The Pegu Yoma, owing, perhaps, to the absence of limestone and other suitable formations, and partly owing to inferior elevation, shews but little evergreen forest: a glance at the map will shew how, though the evergreen forest (indicated by dark green) crowns the Arrakan Yoma, and east of the Sittang again forms a conspicuous feature along the hills, culminating in its profusion in the high ranges a little to the north-east of Maulmain, only patches towards the south are marked in the Pegu Yoma.

True evergreen forest hardly found in the Pegu Yoma, but *moist forest*.

28. Nor are these patches always true evergreen forest. *Moist forest* is not unfrequently found, but that is dependent entirely on local situation. Low-lying tracts or belts, and also deep dells and hollows are occupied by a moist, green, and cool forest, in which the exquisite forms of the rattans (Keing) (*Calamus arborescens*), "zanooben" (*Wallichia caryotoides*), "zalooben" (*Licuala peltata, L. spinosa*), and graceful ferns (*Alsophila et gen. var.*) with huge fronds, in truly tropical profusion, form a picture that strikes the stranger who beholds it for the first time as more like a fairy scene than a real forest.*

29. The evergreen forest, on the other hand, forms in the Salween and Yoonzaleen hills vast belts and masses of forest on the highest ranges, in places also taking a very well defined relative position. Thus, in the western Karennee forest to the east of Tonghoo, on reaching the hills, the evergreen forest in a dense belt is met with; above that teak, and above that pines (*P. Khasyana*). It would seem that the evergreen forest occasionally *encroaches*: such forest sometimes contains enormous teak trees, and this is accounted for by supposing that the forest once bore a different character.

Trees in the evergreen forest.

30. The chief trees in the evergreen are the Thingan and varieties (*Hopea odorata,*) and *H. scaphula*, Thitkado (*Cedrela* species), *Garcinia, sp. var.*, several *Leguminosæ* such as *Albizzia Cassia*, etc.; species of *Quercus* (*Q. Amherstiana*, etc.), and *Castanea;* also an *Antiaris* or poison tree, one of which Mr. Brandis measured in the Thoungyeen, and found to be 38 feet in girth and 250 feet high; *Artocarpus mollis* (Toungben) is another enormous tree; there are also species of *Guatteria, Myristica, Nephelium*, and numerous *Annonaceæ*. Many trees occur for which even the natives have no names.

Character of the forest.

31. Here a dense shade reigns all the year round; the soil in the upper portions is usually full of stones and rocks of the limestone and other formations in which the forest delights; but on every slope and down in the valleys by the streams, there are beds consisting of a rich and deep *humus* that never dries up; it is formed of layers of decaying leaves that have fallen year after year, perhaps for centuries, and is rarely exposed to the sun's rays. Gigantic stems of trees rise clear and branchless to a height of eighty to a hundred feet; some of the species throw out enormous buttresses from the lower part of the stem. The total height of many of the trees is from 150 to 250 feet.

Undergrowth.

32. The undergrowth is not unfrequently rather dense, of tall succulent herbaceous plants which like the deep shade and moist atmosphere. The long, rope-like rattan *Calamus latifolius*, the *Caryota*, the "Zaloo" and "Zanoo" before spoken of, and the *Alsophila*, an arborescent fern, abound. No fire ever penetrates, or could touch, if it did penetrate, the humid vegetation. No cultivator ever cuts a toungya in such localities; the work is too heavy.

Their climatic value.

33. Fortunately, then, these forests are safe; but it is not difficult to picture to oneself what the climatic result would be, if these store-houses of moisture that drink in, like a vast sponge, the rains of the south-western monsoon, and live among the humid mists and clouds that come up from the sea, were destroyed and the hills left bare.

Cause of the evergreen forest.

34. It has not, as far as I am aware, been determined whether the evergreen forest is entirely dependent on a rocky soil, limestone especially, or whether it is the elevation and fuller effect of the south-western moisture-laden winds from the sea, or whether it is that the sites of the evergreen forest are so

* In Mr. Brandis' journal appended to the working plan of 1868, a curious instance is given in the Pounglin forest (near Wah khyoung) of moist forest clothing for a considerable area, low laterite undulations, which I suppose had numerous springs, or were so situated as to receive an immense infiltrated supply of moisture from the formations in the vicinity, and this saturated the entire strata. There were palms and canes, and for trees, species of *Carallia, Vitex, Eriodendron, Bignonia, Pierardia (Baccaurea), Dillenia*, etc.

formed as to be sub-soil reservoirs of the moisture of other ranges of hills; but the Maulmain district in which the great glory of the evergreen forest is put forth, has (on such data as I can obtain) a rainfall of 208 inches.

The Arrakan Yoma much depends on the rain-fall of the Arrakan side, and the Sandoway district has 223 inches. Contrast between rain-fall on the Maulmain hills and the Arrakan Yoma, with that of the Pegu Yoma.

In the districts traversed by the Pegu Yoma, which has only tertiary strata and a lower elevation, the rain-fall varies from over 140 inches at the southern end to 50 on the north-west side (and 70 on the east side) at the northern end.

35. Still the hills of the Pegu Yoma are green and luxuriant, clothed with magnificent high forest up to the very summit. Bamboo is largely interspersed, and of this there are a great many varieties. The huge hollow 'wáh-boh' *(B. gigantea)*, the scarcely less magnificent 'Kyá-thoung-wah,' the Meenwah *(B. stricta)*, and, in dry places, Theikwáh and Tinwáh, are among the best. In the deep dells of streams, a creeping bamboo, with large green leaves with a bluis-lustre (Wáh-no-ay), delights to spread itself—beautiful but useless. The thorny bamboo (*B. spinosa*) occupies the alluvial banks of streams. Forest clothing the Pegu Yoma.

36. The flowering of the bamboo is a remarkable feature. It is not known what period each species lives before it flowers; but it seems that different species flower at different intervals; some only once in 30 or 40 years, others once in 5 or 6 years. When the flowering happens, the plants seed profusely, and then die over a whole tract of forest at once. The forest is thus filled with masses of dead stems, which, falling all round, render the forests impenetrable. As soon as the stems are dry, the forest fires of course clear the country. It sometimes happens that the bamboo seed is destroyed by the fire, and then tree forest encroaches and covers large tracts that were formerly bamboo. When the seed does germinate, a dense crop comes up like young wheat: it is of slow growth during the first three or four years, after that it forms an impenetrable thicket, and soon reaches its full stature. In the higher hills, where the fires do not reach, the dead stems of the bamboo afford a considerable obstacle. In crossing the Yoma, by the Za-dee-bong pass, we came across some tracts completely blocked up by masses of dead Kyathoung bamboos lying crosswise one upon the other, as if some giant scaffolding had suddenly been thrown down and left to lie. Through this a passage for men and elephants had to be regularly cut by an advanced guard of stout Karens, with their heavy forest dahs. No severer test could prove the excellency of these weapons for forest work. Flowering of the bamboo. Bamboo forest sometimes gives place to tree forest naturally. Reproduction of bamboo. Obstacles to travelling

37. The forest is green and shady till about the month of March, when the trees and bamboos shed their leaves, and the forest is open and hot till the showers fall in May. Shade in the forest.

This is true of the whole hill ranges up to the north of the Tharrawaddy Division, below Prome.

38. Far other is the dreary sight that meets the traveller on entering the Prome district: here, though it was but January, when the Tharrawaddy was green and cool, the outer ranges of the Prome hills were one mass of bare stems and without foliage. The bamboos through which we passed were white and dry, the ground under it totally uncovered by any herbage, dry and cracked. Elsewhere a rank but sparse jungle covered the ground. Here and there a few blackened stumps and occasional bare girdled stems, marked where high forest once had been and is now no more. All the outer hills are like this. A peculiar whitish, dried up tint prevails over the whole landscape; only occasional bits of cotton cultivation present a green, fresh appearance that makes the rest look more bare by contrast. Notable change in the condition of the country in the Prome hills. Effect on the temperature and climate.

The sunshine, even in January, is oppressive; the cart tracks which are numerous, wind through the miserable vegetation of the "poon-zohs" (that is, sites of toungyás);—the dust is suffocating, for not a tree stands by the wayside, and the toungya is cut close to the track. The dew-fall, so abundant in the Tharrawaddy as to drip on to our tents in the early dawn from the trees overhead as if raining, was greatly diminished, and indeed in places totally absent.*

* The description of Eastern Prome is borne out by Mr. Theobald, who says;—"There is no physical reason that I am aware of, either in the shape of the hills or their composition, for the great contrast which exists between the outer and inner hills in Eastern Prome. Yet nothing can be more striking. Within the inner hills, that is, beyond the line of villages and the range to which the clearings have reached, the trees retain their freshness during the greater part of the year, and even in the hot months present a grateful shade, whilst in the outer hills * * * * * the few trees of any size that occur, are smaller than usual, and with the stunted appearance of arrested development, which, viewed in conjunction with the generally parched aspect of the vegetation over the whole tract, can only be referred to the injurious climatic results of indiscriminate clearings, and the great diminution of atmospheric humidity and increase of atmospheric temperature thus brought about."

The inner ranges alone retain their condition, and here population has no yet spread, so that the forest has not been sacrificed. Where the teak forest has been reserved, the quality is good, showing that the soil of Prome is not at fault; if the growth is somewhat slower owing to the less degree of moisture, the boles are round and well developed.

Rain-fall of British

39. The rain-fall may now be conveniently referred to. The data it is feared are not very reliable. I have only been able to get them for four years, but there is no doubt that they do give on the whole, a fair idea of the proportion or distribution of rain-fall. The average, 59·2 for Myanoung district, is, judging from the appearance of the district, too low. Except in its northern parts, adjoining Prome, Myanoung shews a great difference as regards verdure.

Rain-fall in British Burmah.

Stations in order of quantity.	1868.	1869.	1870.	1871.	Average for four years.
	Inches.	Inches.	Inches.	Inches.	Inches.
1. Moulmein	211·20	189·85	185·45	245·7	208·05
2. Tavoy	193·70	190·55	185·60	229·9	199·3
3. Shwégyeen	187·50	183·10	183·80	201·9	189·07
4. Mergui	178·40	165·00	147·70	164·4	163·87
5. Rangoon	...	...	144·60	143·4	144·00
6. Bassein	138·56	89·14	87·54	93·4	102·16
7. Toungoo	...	46·90	64·53	101·3	70·91
8. Myanoung	52·40	35·78	74·13	73·8	59·20
9. Thayetmyo	50·15	33·20	41·13	54·6	49·77
10. Prome	48·50	34·00	46·21	62·9	47·90*
ARRAKAN ... Akyab	208·70	187·16	176·10	199·8	192·94
ARRAKAN ... Kyoukphoo	153·90	166·11	157·50	193·1	167·65
ARRAKAN ... Sandoway	253·15	191·50	217·93	229·9	223·12

Remarks on the table of rain-fall.

40. The districts farthest south and nearest the sea have the most rain-fall, but that is not all. Maulmein is, I believe, considerably affected by the influence of the lofty hill ranges crowned with evergreen forest. The Shwégyeen district, also, is within the influence of the forests to the east.

The northern districts on the west side of the Yoma, less than Toungoo on the east side. Caution enjoined by these facts.

Prome and Thayetmyo have the smallest rain-fall, considerably less than the most northern district (Toungoo) on the other side of Yoma.

41. With this tendency to diminished rain-fall in the northern part of the Province, it is essential that the forests should be carefully preserved in the hill ranges. We have not statistics going far back enough to shew whether the low rain-fall in Prome, has not been rendered still lower of late years in consequence of the denudation of all the eastern portions—it is quite possible that it may. It cannot possibly be doubted, that it is not merely the geographical position of the districts, but also their position in relation to the great forest-clothed ranges of hills that influences the various rain-fall the table exhibits. Equally impossible is it to doubt that, by the power of these forests to absorb atmospheric moisture, and prevent rapid evaporation from the soil, the water-supply at the heads of the streams is maintained.

Effect of the forests cannot be doubted.

The soft friable formation of the hills enjoins the necessity of preserving this forest covering.

42. The formation also of the hill ranges, and the nature of the soil demands the preservation of the forest, and makes the country peculiarly exposed to danger, should denudation be carried on to any great extent.

* The rain fall continues to diminish as we go farther north along the Irrawaddy valley : at Págán it ceases altogether. From that point however upwards, it again begins to increase, till at Bhámo there is as heavy a rain fall as in the extreme south.

43. In the first place, nothing struck me more in going through mile upon mile of forest than the total absence of *humus*, especially on the slopes: even in the level places and portions near streams, a rich *mineral* soil more or less blackened by organic matter was observed, but nowhere anything approaching to the true *humus* layer. The cause of this will appear presently, nor is there any close, mossy, or small herbaceous undergrowth.* Absence of *humus* or vegetable mould.

44. It is important to remember that we have not merely to consider a *forest* as a collection of so many trees: it must be taken as a whole, as a natural organism with its several members and component parts, its trees, its atmosphere, its undergrowth, and its soil. The trees of a high forest act as distributors of rain-fall: they catch the water, cause it to be gradually expended by dripping, and so forth; and a good deal is re-evaporated without descending. This breaking of the violent fall, especially with tropical rain, prevents the formation of violent torrents and the sudden abrasion of the soil. A forest is an organic whole.

45. But whatever trees do in this way, the *humus*, moss, etc. do tenfold. The absorbing power of this spongy mass is truly marvellous; and it is just because this is absent in nearly all our forests that the soil is nearly everywhere on the road *towards* deterioration, and in many places is much exposed to be torn away whenever rain falls. This (among other evils) causes the soil to be washed away from the roots of the trees, and frequent "aulay" trees—trees fallen and blown over—are the result. The power of the *humus* greater than that of tree foliage.

Without the preservation of the forest, therefore, we are certain, at no distant date, to suffer. Certainty of damage from forest denudation.

46. Nor is this all; the majority of the forest lands being on the tertiary formations of sand, marl, and shale, these soft strata are more them ordinarily liable to the effects of climate, to abrasion, landslips, cutting of deep ravines, and so forth. The soft strata are also endangered.

47. The denudation of the forest, therefore, will expose these hills to great danger. Their slope and general form will be gradually altered, and springs and perennial stream sources will disappear. When the rainy season sets in with tropical fury, the unprotected clays and sandstones will melt before it like a snow-drift, huge ravines will form, torrents of turbid water will flow in them with irresistible though brief fury, masses of sand and boulders will be carried down by the torrents to the lower streams; cultivation will be endangered by the cataclysm; either the soil itself will be cut away or its surface marred by an alluvion of sand, stones, and mud; the main streams will be affected with sudden and abnormal risings, and the great rivers will be affected also to the detriment of the embankment works. Effect of rain in altering the form of hills, and causing dangerous torrents and floods.

48. This is no exaggerated picture; it is an exact description of what has actually come to pass in the Punjab and other parts of India. Example of other provinces bears out this fear.

49. But besides the preservation of the forest on the higher ranges, a further protection is afforded in the preservation of the laterite tracts covered with 'Eng' forest. Preservation of the 'Eng' forest.

These in the first place have comparatively hard beds of rocky material, which, if protected by the clothing of natural vegetation, are calculated to act as barriers, consolidating the soil and preventing the rapid disintegration of the softer strata beyond.

50. It is also noted by Mr. Theobald, who is a good authority on the geological question, that, besides the hill streams taking their rise in the hills above and beyond the laterite tracts, numerous springs swell forth from the skirts of the tract itself. He speaks of water being procurable in shallow wells or natural springs, "the entire sandy tract of Eng forest forming as it were a vast sponge for the reception and storage of the rain-fall of the country." Mr. Theobald on 'Eng' tracts.

51. This resembles the case of the Sub-Himalyan tracts, where there is a belt of sand and boulder land (producing sâl trees), known as the Bábar tract; the belt is some 15 miles wide, and being bordered on the outer slope by clay beds, forms a sort of reservoir into which the waters from the lower hills filtrate, and where they are stored, to be given out again through the clay bed and watering the moist "tarái" tract beyond. Comparison in the Himalayan "Bábar."

52. In places this Eng forest is being very rapidly denuded, and such is its dry, sandy nature on the surface, that if once thoroughly destroyed, Denudation of the Eng tracts.

* The undergrowth is rarely dense: on the drier slopes it is almost *nil*: in the "lower mixed forest," and generally in moister parts, a blue flowering and other acanthaceous plants are common, and cover the ground: in moist parts, there is rich soil and the wild plantain abounds as undergrowth with species of *Curcuma*, *Zingiber* and *Globba*.

it will never recover, and of course its capacity as a sub-soil reservoir will gradually cease. I would especially invite attention to the configuration of the great laterite beds to the south-east of the Prome District, where they spread out almost close to the Irrawaddy itself below *Emmah*. This tract, as Mr. Theobald justly remarks, is sure to come in for extensive destruction as soon as the Prome Railway works reach the vicinity.*

Laterite to the South-east of Prome.

53. In a great many places I observed the Eng greatly over-felled; large trees were cut down indiscriminately and sawn up, as the Eng wood yields planks readily saleable for in-door work.

The cutch or "Shāh" forest.

54. The tracts of Shah or *acacia catechu* forest form another remarkable feature: these are found to the north of the province, chiefly, though not exclusively, in the Prome and Thayetmyo districts.

Manufacture of catechu.

55. The larger cutch trees are valuable for house-posts; but trees of all sizes are cut for cutch-boiling, though the larger sizes are preferred. This process is everywhere carried on without the least check or restraint; the trees are cut down without any regard for reproduction, or of the size of the tree, split up with much waste into chips; these are boiled in large iron cauldrons, rude earthen supports being made for them in the forest and fire kindled underneath. The red juice is then poured off and several times boiled down till sufficiently inspissated: the *catechu*, when dry, is cut into flat cakes, about 6″ × 1½″ × 1″. It sells at Rangoon for Rs. 19 or 20 per 100 'vis'=365lbs. on an average. No tax is levied on this product, and no restraint is placed on its felling.

Yields no revenue to Government.

Table shewing export of cutch.

Year.	Total in maunds.	Made in British territory, maunds.	Made in Burma, maunds.
1870-71	220,795	137,817	82,978
1871-72	224,289	135,338	88,951
1872-73	415,610	287,768	127,842

Cutch tracts marked in the map.

56. In the map, tracts surrounded by a *pink* line are observed in Prome; these form blocks of the forest of almost pure *Acacia catechu*. Large areas not yet demarcated are known to exist on the western side of the Irrawaddy, but have been so destroyed that now it will be to replant not to reserve that the tracts will be taken.

As the Government have admitted that this system is to cease, it is only necessary to allude to the facts of the case, but I cannot help remarking that though ordered in 1870, nothing practical had been done up to date. At Mr. Eden's request, I went with Captain Seaton to Thayetmyo and Prome to arrange for something definite. The former delay is partly the fault of the clumsy system of survey and report hitherto requisite; but ten years ago proposals would not have been listened to. This certainly warns us what we may expect if we neglect our *other* forests.

The terms of reservation and the proposed treatment of the cutch forest will be found in Appendix A.

Reproduction of cutch trees.

57. Reproduction by seed is easy, and the tree coppices readily. It is best pure, and does not answer mixed with teak. An experiment of this nature was tried in the Tharrawaddy and failed.

58. It may be convenient to recapitulate briefly the classes of forest in Burma; thus—

I. Jungles of the delta, brackish moisture-loving plants. *Avicennias*, *Nipa* palm, &c.

II. Jungle of the plains liable to inundation. Grassy savannahs, with sparse trees of *Lagerstræmia*, *Butea*, *Bombax*, and "seet."

* This has already been the case to some extent for the sake of the river steamers. In the Administration Report, 1868-69, paragraph 14, it is said:—

Steamer fuel.

"The effects of the large consumption of firewood by the steamers plying on the Irrawaddy are beginning to be "observed along the banks of the river. From Rs. 12 to Rs. 20 per thousand large billets is the price paid at the "fuelling stations. *The wood is chiefly obtained from the Eng forests* and other belts of jungle within a short distance "of the river banks; everything almost in the shape of wood has fallen a prey to the axe in these parts, and only "the smaller seedlings have been spared."

Since writing this note, I have made a steamer voyage up and down the Irrawaddy; the fuel I find of the most miserable description, most of it consisting of *young saplings*, many of them *A. catechu!* At most of the fuelling stations, the people said that wood in the vicinity was not to be had, and they had to go some miles for it and bring it down in boats from those Prome tracts alluded to.

III. Forest of the plains, moist soil. *Ficus* and creepers, "Kanyen," *Dillenia Grewia, Bignonia, Albizzia, Lagerstrœmia, Bombax*, &c., bamboos.
IV. Forest on lower undulating ground, (called "lower mixed forest"). *Pterocarpus, Homalium* "Pingado" bamboos, *Careya*.
V. "Eng" or *Dipterocarpus* forest; pines on laterite.
VI. Teak forest as described at paragraph 26.
VII. *Acacia catechu* forest.
VIII. Mixed forest of the higher hills. Teak, bamboos, *Pentaptera*, &c., "Endeik" *(Dalbergia cultrata), Pterocarpus, &c.*
IX. Moist forest, with palms, canes, ferns, &c.
X. Evergreen forest proper.

Great sources of damage in Burma are 'toungyā,'—clearing and fire.

59. The great sources of damage to which the forests generally are exposed are clearings for temporary cultivation known as "yā" or "toungyā," and fire.

Permanent cultivation.

60. Before proceeding to these I may as well say a word on the permanent cultivation, which is of course the most paying and the most desirable to encourage by every means in our power. It is seen in all the valleys and is even in the better populated districts creeping up into the outer hills: it chiefly consists of paddy.* All trees are entirely cleared from the ground, larger ones being girdled and left standing dead. Shade is thought deadly, and no kind of tree is allowed to stand if it can be avoided: hence, where there is a continuous area of paddy cultivation, the country is open for miles, and only clumps† of trees are found where cultivation has not yet entered, or where the trees are left within the limit prescribed by the waste land rules, to be described hereafter.

Paddy cultivation.

Clearing of trees.

In the plains the houses being more or less slender in construction, the vicinity of trees is avoided, lest heavy branches should fall and crush the roofs during a storm.

Gardens of fruit trees and plantains, however, always form a pleasing and picturesque feature near villages.

Yā cultivation.

61. The toungyá cultivation is so well known as not to need much description. The area in each clearing is generally not very large; the size being estimated by the number of baskets (1 basket of 35½lbs., 3 baskets, 4 baskets, etc.) of seed it takes to sow them. Everything that can be cut is so; large trees are girdled and left. When the refuse on the ground is dry, in the hot weather it is set on fire, and everything is reduced to ashes and fragments of charcoal. This is worked into the soil, and then the land is sown with paddy or cotton or is converted into a mulberry garden, where the silk-rearing Lebeng villages occur.

Rotation of toungyás.

62. Properly speaking, the toungyá gives but one crop at a time, sometimes the same ground is cultivated for two years running. Then the place is abandoned for 20, 30 or 40 years, before the toungyá cutter returns to the old site.

Gradual restoration of the forest.

63. Left to itself the poonzoh, as it is called, under the influence of the tropical rain, gets covered with a dense jungle in which numerous young trees appear, and gradually the forest is restored. No doubt, where the rotation is as long as 40, or even 20 years, the climate and natural vigor of the soil, and the fact that seed-shedding forest lies on all sides, enable reproduction to take place; and thus people get an idea that toungyá cutting in the hills does not do so much harm after all.

Character of forest changed however. And where the rotation is short the damage is soon visible.

64. But the character of the forest is ruined: good trees disappear and are succeeded by worthless kinds; and the instant the rotation is shortened, the forest has not time to recover, and the deterioration is then very visible. In Prome, for instance, the dense population has limited exceedingly the ground that the people think practicable for toungyá cutting. Hence the rotation is extremely short; the same ground is cultivated for a second always, and often for a third, crop; sesamum and cotton following the hill paddy. Even then the cultivator is obliged to return on the same land in the 6th or 7th year. The result has been the condition already described in my own words and those of Mr. Theobald (*ante*, paragraph 38 and note).

* By the returns of 1871-72, Administration Report, Appendix D. page cx, it would appear that out of a total of 2,208,640 acres cultivated in all British Burma, 1,886,021 acres, or 83 per cent. of the whole, was rice (paddy). It is not easy to compare the other products, as the classification adopted in the table is not uniform, especially as regards fruit trees and toungyá products; cotton, oil seeds, and vegetables seem to come next in order.

† The mortality among cattle in Burma is so extensive as to be exciting considerable alarm: it is attributed in a great measure to *exposure in these open fields* and the absence of all proper *shade*.

A miserable parched scrub has taken the place of the forest on all the outer hills. In some places the people are compelled to make their cultivation permanent.

Difficulty presented by the interests of settlers.

65. The toungyá system presents a considerable difficulty; the object is to encourage settlers. But these are all, or nearly all, inveterately attached by centuries of habit to toungyá cultivation. Now, as every one will admit that a considerable forest area *must* be reserved against such destruction, the time will come, though it may now be not very near, when the area for toungyás will no longer exist, and the cultivation *must* be made permanent. Of the lamentable destruction of teak by 'toungyás' mention will be made further on.*

Fire.

66. The remaining evil is fire. This of course owes its origin to toungyá fires spreading; to the practices of the moksás, or huntsmen, who fire the jungle for game; to the use of fire in promoting the flow of the 'Kanyen-si' or wood-oil, and in collecting honey; and not unfrequently to camp fires, and to burning embers dropped by the huge cigarettes much smoked by the Burmans.†

Forest fires described.

67. At the dry season of the year the leaves of the trees fall off, and the undergrowth thus exposed withers; everything becomes crisp and dry, and the least thing sets it in a blaze. In end of March and April the forest fires are a regular annually recurring phenomenon, just as the south-west monsoon is.

Mr. Ferrars' description quoted.

68. Mr. Ferrars, Assistant Conservator, who has just been employed to make a carefully-detailed examination of the Myolha forest (Sittang,) remarks on the poverty of reproduction. He says: "The character of the stock itself is peculiar: it consists almost altogether of large trees. One-half of them are mature, one-fourth not mature, and one-fourth going to decay; and of the number which are not mature nine-tenths are large enough to make house-posts. I did not meet 50 teak seedlings in the whole forest.‡ The existence of such a large stock and of such a kind speaks for the fertility of the soil, but proves the existence of an agency so deleterious as to allow but a small proportion of seedlings to come up in excess of the old trees which die off. * * * * In the month of April, the ground

The ground bare.

was as bare under the trees as a freshly-ploughed field: the cause of this, no doubt, is the annual fires. The surface is covered at the beginning of the hot weather with a layer of leaves, principally teak, about a foot deep; the large leaves become baked by the sun§ to absolute dryness; they become crisp and curl up, thus thoroughly ventilating the combustible material. A fierce burn is the consequence."

Fire the cause of the total absence of *humus*.

69. This fire, everywhere occurring, is the cause of the total absence of *humus* already alluded to (para. 43), not only so, but seedlings are destroyed, perhaps one in a hundred, or a less proportion even, surviving till the next year's fire burns them down again. The roots of grown trees are damaged, and the lower part of the stem also; no doubt this often gives rise to the diseases of teak, giving the first start to that vein of decay that so often is found on felling

Diseases of teak trees due to this cause.

a tree, and being the principal cause of the numerous "tachán-thay" or half dead half alive trees that are found, most of them *not* in that condition by the effects of age.‖

70. Whether from the results of these fires or from their influence, combined with other causes, I must say the general impression made on my mind, as an unprejudiced observer, after traversing a very considerable area of teak

* Toungyá cultivation pays a very light tax: it is not assessed by the acre, or by the value of the crop, but simply by a fee of one rupee per 'dah', that is, for each male who cuts the toungyá. This prevails in Rangoon, Bassein and Myanoung. In Prome and Thayetmyo, the family, not the individual, pays one rupee. Considering the great advantage of permanent cultivation, it would be worth while to take some steps to encourage it by making the assessment on permanent cultivation *nil* for some time.

It should not be forgotten that toungyá cultivation is a system that *must* in time die out, when the population has increased sufficiently. To reserve a portion of forests against toungyá is simply to anticipate by a few years what ultimately must happen anyhow. Take Prome for instance. If not an acre of forest were spared, and population went on increasing, toungyá would ere long become impossible, there would be no more forest to cut.

† These articles are large tubes made of leaves, or of maize husk, or the sheath of the areca palm, and are filled with a little tobacco and a large admixture of dry tobacco-stalk, scented wood, etc: the burning embers which fall are very dangerous.

‡ He says in a later portion of the report that where he did see a few seedlings they were on mole-hills: the hard burnt earth of the forest could not receive the seed to germinate; but a seed happening to be where the soil was loosened and pulverized by moles or rats it took root.

§ The forest at this season is leafless overhead.

‖ The injury done by fire will not need any demonstration to an educated forester; but for the sake of those persons who still imagine that the annual fires do no harm, I may mention that it is no argument to say that the teak forests *do* exist. They do so in spite of fires; but there is no doubt from what we can still see of the ruins or remains of magnificent teak forest that our forests are steadily deteriorating. In ancient days, before population spread, as it is now doing, fires were rare, if not entirely non-occurrent. The moist shady forest offered no chance of a fire spreading, even if accidentally kindled by lightning.

A—Portion of bark and sapwood originally wrenched off the parent stem; has cicatrized over and grown, sending out shoots which have been killed by fire &c.

forest, was, that compared with reproduction of Eng, and what we see of deodar and *Pinus longifolia* and saul in India, the natural reproduction of teak by seedlings *is most miserable*. There are of course patches in every forest, and possibly whole forests out of the total teak area, which are exceptions, but I speak of what is the general state of things.

Natural reproduction of teak, *as it is*, strikes the traveller as most miserable.

I am aware that some forest officers in Burma are offended at such an assertion, and they will call your attention to a seedling here and then one there, and assure you that there are more than you think for; but the very fact that you have to go on a regular hunt to find a dozen seedlings, as a rule, proves what I say. I was also in the forest not at a time when forest fires had burnt down the seedlings, or when the leaves were off them, but when the trees and vegetation were in full leaf, and teak seedlings had large leaves, quite large enough to render them very visible, if the reproduction was other than I describe it, miserably sparse and insufficient. What it *might* be, and I think certainly would be, under altered circumstances, is another matter.

This assertion called in question, but proved true. No under-estimate caused by period of visit, but might be good, and would be, under altered circumstances.

71. It is only due to the tremendous vitality of the teak tree that it survives as it does. That vitality is surprising: seedlings will live suppressed in a thick "poonzô" tangle from two to three years, and suddenly being cleared overhead will take a new start.

Vitality of teak.

A seedling burnt down will shoot again if it has once got a hold on the ground, but not unless.*

Power of young seedlings to recover.

72. The old-fashioned plan of seasoning timber by leaving the log lying on the ground with bark and all on, is based on the fact that the sap in it is used up to a certain extent in the effort of the organisms to continue the functions of growth. Moung Poh Oh, Assistant Conservator, assures me that he has seen a teak tree felled green, and lying on favorable soil, put forth shoots.

Case of teak log severed, sprouting when left on damp ground.

73. It is well known that in girdling a teak tree, care has to be taken to cut entirely through every portion of the bark and sap-wood: if, by reason of a crevice, or fluted stem, in the inmost recess, a small strip is not completely severed, the flow of sap is maintained and the tree will not die, but the bark will commence to cicatrize over the girdle cut.

Insufficient girdling does not kill the teak tree.

74. Mr. Ferrars observed also, in the Koon, a curious instance. A mass of white-ants had collected round the stool of a girdled tree, and had spread over it, carrying quantities of earth with them as their manner is, to form their 'covered way.' This earth encrusted the girdle, and must have done so almost immediately after the girdle cut was made; whereupon the tree threw out small abortive rootlets from the stem, which endeavoured to live on this earth. In fact it was like the process of ringing a fruit or other tree's branch for propagation.

Curious case observed by Mr. Ferrars in the Koon forest.

75. Here is a sketch of a teak tree in the West Choung-goung-gyee forest (Prome). Observe the injuries against which it has struggled; a large piece of bark and sap-wood was wrenched off, but not entirely severed; this continued growing and threw out several branches, the end one, and two side ones from their position were exposed to fires and were killed. At last an upright shoot took the lead.

Teak tree surviving injuries in the Choung-goung-gyee forest.

76. Unless, then, we can keep toungyá clearings out of the forests we want to keep up, and fire also out of *every part* of the forest which we hope to be reproduced or maintained in a really progressive condition, we shall certainly fail, and our aim must be to secure these forest objects without losing sight of the progress of cultivation and settlement.

Absolute necessity for keeping out fir from forest to be uniformly reproduced by natural seedlings.

77. But other causes also tend in a secondary degree to diminish the supply of timber, and I must briefly notice them before I close the general portion of my report.

Other causes of forest deterioration

78. The Burman is the most wasteful creature with respect to wood and forest produce I have ever known. He lives half a forester amid the jungle, and is always armed with a "dah,"† with which to cut his way, if necessary, or

The Burmese very wasteful in using wood, &c.

* Mr. Brandis says (workingplan of 1868, paragraph 35):—"Most young teak trees in these forests, if carefully examined, are found to have sprung from a hard woody stock or stump of irregular shape under or just above the ground, which bears the marks or remains of numerous shoots that have, one after the other, been destroyed by the fire.

"Most of the 4th class trees are not seedlings a few years old, but shoots from old stumps, and these stumps are frequently more than 20 years old before they manage to send up their final stem."

† Dahs of every variety exist, from the thin sword blade unsuited to forest purposes, to the well-balanced broad-bladed thick-backed Karen "dah," which is equal to any modern "serpe," bill-hook, or pruning-knife I have ever seen.

obtain what he requires for domestic use. Armed with this, he cannot resist the temptation to hack, gash, or whittle every tree he passes.

Useless felling of trees.

79. I have constantly found large trees of the "Gway-ben" (*Spondias mangifera*), felled simply to pick the fruit. Trees are also cut for the sake of getting wild bee-hives with their honey. In collecting the bark of the "Shaw" (*Hibiscus macrophyllus*), the *liber* or inner bark of which yields an excellent material for rope, the people will kill a large tree or cut it down; whereas, if the material were removed in strips, at intervals, from younger trees in the vigour of growth, the tree would recover itself, and thus a permanent supply be maintained.

Destruction of "Shaw" trees for their bark.

And in collecting "Kanyen" oil.

80. In collecting "Kanyen" oil (*Dipterocarpus alata*), they cut a huge niche into the tree, letting the oil collect in the hollow at the bottom. Several such niches are cut in one tree, and when the oil does not flow freely, fire is applied to stimulate it; thus the tree is often burned and always injured. Kanyen trees are also wantonly felled for purposes for which other wood would answer as well or better. The other Dipterocarpus, "Eng," is treated in the same way.

Waste of the Thitsi or varnish tree. Nothing paid for collecting the produce. And trees burnt for charcoal.

81. The collection of the valuable black varnish of the Thitsi (*Melanorrhœa usitatissima*) is similarly badly managed, and is allowed, even for export, quite free of charge. Moreover, these trees are wastefully felled because blacksmiths think the tree makes the best charcoal for their purposes. This should be prohibited.

Collection of leaves for cigarettes.

82. Similarly, also, waste is perpetrated in collecting cigar leaves. About Rangoon and Prome the people especially affect cigarettes made of the leaves of certain species which retain a green color when dry. Such are the leaves of 'bambway' (*Careya arborea*), and the Hmáya-ben (*Grewia microstemma*). In the north, these leaves are not so much used, but the husk of the maize or the spathe of the *areca* palm: the former is put up in bundles, and the latter in rolls, for sale.

Whole tree cut down to collect the leaves.

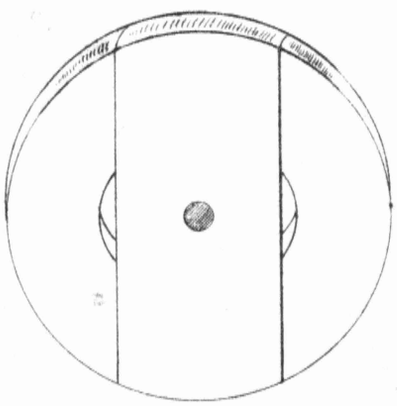
When the green leaves are sold they fetch Rs. 5 per 10,000, and the people cut down the whole tree to get the leaves.

Using small trees to save trouble in cutting up.

83. On the Prome road I observed a number of persons who had formed a camp to make axles for cart-wheels, for, near the towns, wheels with axles and spokes are in use. To avoid the trouble of dressing, iron-wood trees (*Inga xylocarpa*, *Xylia dolabriformis*, Bth.) (Pyingado) were felled young, of just such a girth as the size of the axle demanded: short sections or pieces were cut off and rudely turned. The rest of the wood, probably 75 per cent., was thrown away and wasted.

Cart-wheels.

In Prome, and generally in the country, large, flat, solid wheels are used. They are often made of single pieces, but more often of three pieces, a central oblong and two semicircular pieces; thus—



Price fetched by these, and wasteful method of obtaining them.

For the centre slab they will cut down, unrestrained and free of cost, a huge padouk tree (*Pterocarpus dalbergioides*), and use just a small portion of the best part of the trunk, wasting all the rest: a pair of these, about 4′ × 2′ × 6″, fetch Rs. 8 in the village; when made up into wheels, they will bring Rs. 20, and in towns or populous places as much as Rs. 30 and 40.

Boat-hulls.

84. Undersized trees of thingán, *Hopea odorata* (*H. scaphula* and *varieties*) are felled at an enormous loss for boat-hulls. A small boat-hull will only fetch Rs. 80 or 90, whereas, if the tree were let to grow, at its mature

size, when roughly hollowed, the boat-hull would fetch Rs. 800 or 900, and when finished even Rs. 1,500! This enormous profit is made at pleasure, no fee being charged for the trees. And no fee paid.

85. I have already alluded to the wasteful manufacture of "kutch" (*catechu*), which might easily yield to the State a revenue of Rs. 2,80,000 annually, at only Re. 1-0 a maund.

86. House-posts have also been alluded to: the circumstances of the climate render it desirable for every man to raise his house at least a few feet off the ground. This is done by driving in stout posts, which in fact form the framework of the whole edifice. At a suitable height the flooring is put down, planks and split bamboo, as the owners can afford, and the sides built up with planking or mat-work of bamboos, or both. The roof is of bamboo framework covered with "thekkay" grass. To save trouble, young trees which have attained the sufficient girth are felled, for it is not the custom to *saw up* the wood of a mature tree. House-posts. For these young trees also felled to save sawing up.

87. If the difficulties and expenses of sawing are really great, or otherwise if it is considered profitable to cut trees at such an age for the purpose, provision must be made in time in each district for the supply of so necessary an article, which, in the case of the more desirable woods, threatens to become scarce. Provision to be made for this if really necessary.

88. Bamboos are everywhere abundant, and no interference should be made with people getting them in any quantity for their own villages; but there is no reason why people should go into the forests and take large numbers to raft to Rangoon and other places, where they sell at a handsome profit, without the State getting some share of the benefit from the material which undoubtedly is its sole property. Use of bamboos.

89. All this points to the propriety of securing the legitimate forest revenue better, ensuring, at the same time, a proper, instead of an abusive, utilization of the products. It points also to the necessity of some steps for preventing a deterioration of the necessary materials for building and household economy. Conclusion from a consideration of these points.

PART II.—SPECIAL.

Treatment of the subject.

90. The general conditions of forest distribution and the requirements of the public welfare being such as I have described in the preceding paragraphs, it is now necessary to consider what can be done by Government action to set matters on a proper footing; and my remarks will be conveniently grouped under the following heads :—

Section (1).—The constitution of the forest area to secure the different objects contemplated.

„ (2).—The treatment of forests, and the revision of the working plans as regards those managed by the Forest Department.

„ (3).—The improvement of the forest establishments and method of systematizing their duties and employment.

„ (4).—The rules for the management of forests and matters connected therewith.

„ (5).—The question as to how the material of the forests is to be worked out, whether by Government agency or permit.

SECTION I.

CONSTITUTION OF FOREST AREA.

Consequences of forest destruction.

91. From what has been said, it will be clear that the maintenance of a considerable area of forest as such, is necessary from climatic considerations, even if for no other purposes. Unless we wish to see the supply of water in the streams coming from the hills diminished in the dry seasons, while unmanageable torrents flow therein in the monsoon, unless we wish to see landslips in the loose clays, marls, and sandstones frequent, the beds of streams liable to yearly increasing alterations, fertile lands converted into wastes of sand and boulders, and the main rivers become liable to sudden and dangerous floods, with all the accompaniments of erosion of valuable land, destruction of bridges and costly embankment works, we must be prepared to preserve considerable belts of forest in all the mountain ranges and slopes of the Burma provinces, and assist the preservative action of those belts, as regards the lower parts of streams, by reserving strips of forest near their banks. These latter reserves will, however, more conveniently come under the head of district forests.

Such forests not always available for yield of material.

92. But *all* these forests in the mountain ranges will not be convenient forests for direct utility, that is, for the yield of timber in large quantity for the supply of the market.

Nor could we work them all.

93. Nor even if they were so would it be possible for any such establishment as we are likely to be able to afford for some years to come to treat them in such a manner as forests, whose primary object is direct utility, should be treated.

The condition of the Burma teak forests at present.

94. Speaking now only of direct utility, the condition of the Burma forests, as regards their growing stock, and that, too, fully recognizing the value of other stock beside teak, is, it must be admitted, the most undesirable that it is possible to conceive.

The material of exploitation scattered here and there over enormous areas.

95. Our earlier valuation surveys have chiefly dealt with teak, but the later ones, which take in other valuable trees also, shew a similar condition as regards them. Teak and valuable woods are extremely scattered over enormous areas of forest, whose direct utility (of which I am alone speaking) is otherwise *nil*. Teak will be found in single trees here and there, or in clumps, or in belts more or less well compacted, following the straggling courses of streams and their feeders, and separated by wide tracts of non-productive forest, laterite downs, and bamboo thickets.

Extent of teak forest, and its contents.

96. Of an estimated area of 7,000 square miles of Government forest, 2,397 are estimated to be teak producing, and of this, taking 1,981 miles dealt with in the working plan of 1868 (as representing the teak area exclusive of the western forests not under management, and the Upper Salween, Pandaw, and Attaran forests given out on long leases), we have at the highest estimate

only 1,680,000 first-class teak trees on the area, or about 838 trees to the square mile, or 1·3 to the acre.

And the result of the surveys of 1868 for all classes of trees gave on 100 acres :— Number of first-class teak per 100 acres.

1st class over 6 feet	... 132
2nd „ „ 4 „ 6 inches	... 94
3rd „ „ 1 foot 6 „	... 422
4th „ under 1 „ 6 „	... 874

There is reason, however, to believe that this is too unfavorable, and the latest estimate given in the working plan of 1868 (paragraph 29) is on 100 acres :— Later estimate.

1st class	... 149
2nd „	... 120
3rd „	... 418
4th „	... 1,001

97. Recognizing this state of things, two opposite classes of thinkers on Burmese forests have recommended opposite courses ; one class is for abandoning all the existing forests (they do not seem to recognize the climatic value of the forests) and making large new forests by artificial planting in localities commanding easy export lines. The other is opposed to planting, and seems to wish to take in hand the whole of our teak area, merely giving up really bad portions, thereby simplifying and straightening boundaries. Thus, Mr. Ferrars says :—" Our teak forests are not so large or so rich as we could wish ; on this account plantations are being made. The money which these cost to make and to keep up might be spent with advantage, and with no doubt as to the success, on conservation of the existing forests. When the teak panic arrives,* the resources of the plantations will be a small comfort, but it would be a solid comfort to know that on hundreds of thousands of acres, in its natural habitat, the teak forest was becoming richer and richer." Former ideas as to treatment. One proposes abandonment of natural forests, and creation of plantations. The other objects to artificial planting.

98. But who is going to allow us a staff of ' one Government officer with 30 or 40 woodmen under him' for each district or sub-division of—let us roughly call it—1,900 square miles, or 1,216,000 acres ? Wherewithal shall we stir the financial authorities even to look at our staff schedule ? Objections stated.

99. I urge that the true course is between the two. I do not pit plantations against natural reproduction—I say teak plantation, *i. e.*, artificial reproduction, is part and parcel of our work of regeneration ; take up the best natural teak habitats on a limited area, and devote your whole energy to them. In that area, what with the acreage artificially restored and that naturally reproduced by such assistance as cutting out useless trees, favoring shade-giving trees where the soil is dry and exposed, eradicating bamboos, and, above all, prohibiting resolutely and absolutely, fires, we may confidently hope to see, at a reasonable cost, a compact forest springing up for our yield, *i. e.*, *direct* use. The middle course proposed, a limited area to be put under special care.

100. *Besides* this limited area, placed under complete and careful reproductive management, natural and artificial planting being combined, I would preserve as much other forest as is wanted for climatic purposes, and maintain it as high forest (not merely as degenerate scrub or "jungle.") A very moderate amount of care would do that ; its produce would be, at any rate after the prospects of the other area just spoken of were established, a secondary consideration, though of great value, for the *local* demand which constantly increases with the population ; and there is a further consideration which will be noted presently. A larger area to be subject only to general protection.

101. All this points to two classes of forest being constituted—under the management of the department I mean—for I shall speak of yet a third class, presently ;—the "ordinary reserve," chiefly for climatic purposes, and the "special reserve," chiefly for yield of valuable material for export, &c. Two classes of forest proposed under the Forest Department.

"*A.—Extent of ordinary reserve.*"

102. As regards the extent of the ordinary reserve required, at present it has to include all the bulk of the existing teak area,† so as to protect it from Extent of 'ordinary reserve' required.

* *i. e.*—When the foreign forests, now giving 77,000 tons a year, give no more.

† I say the bulk, for I advocate at once throwing out all outlying and really indifferent forests and simplifying boundaries everywhere, not grasping at every teak tree to include it, and so creating awkward angulated boundary lines which no one can follow on the ground.

Failure of the present rule 9 to protect teak.

"*toungyas.*" If this is not done *while* the restoration of our special reserves goes on, the supply will certainly fail. The fact is simply this; the existing rule 9 prohibiting "toungyas" in teak localities does not work. Year after year the most serious destruction of teak in defiance of the rule is reported, yet no orders can avail to stop it, as the magistrates refuse to convict even the few cases that are brought up, or award fines of Rs. 2 and 5, at which the people laugh, and go on cultivating toungyas in the very places where they were convicted before of destroying teak.

The difficulty has to be overcome.

103. The answer made is no doubt—"such a rule all over the country can never work; you must demarcate what you want to reserve."

This is perfectly true, and it is what is here proposed, only it must be remembered as regards the extent of reserve, that the blocks must be *at first* very large, because teak, even in the best tracts, is so scattered, that unless we take up large areas, we *cannot possibly* preserve teak enough against the toungyâ-cutters to yield our market supply, while we are creating and restoring the other forests. The hope we hold out is, that as the work of progress goes on we shall be able gradually to give up some of the area; as, no doubt, we shall not ultimately want for the "ordinary reserve" as much area as the *temporary additional consideration* just broached now compels us to ask for.

There ought to be no difficulty in finding forest land.

104. But even reserving pretty freely, there ought to be no difficulty (as the Government of India observe in their orders on the report of 1868-69) in selecting forest without clashing with the interests of population in a country of 94,000 square miles, of which only 3,000 are cultivated (1868).*

But population is unequally distributed.

105. Not that the present paucity of population and cultivated area entirely obviates all difficulty, for that population with its attendant cultivation, limited as it is in total, is comparatively dense in its distribution in some parts, *e. g.*, Eastern Prome, and in parts of the Tharrawaddy, especially towards the undulating grounds that give the first indication of that vast network of hill spurs and ranges that extends inward towards the main crest of the Yoma.

The following table, abstracted from the Administration Report of 1871-72, shows the districts in order of density of population and extent of cultivation.

* In 1871-72 cultivation had increased to 2,143,968 acres, or nearly 3,350 square miles.

Land.					Population.			
Order of density.	District.	Total culturable land in square miles.	Total cultivated in square miles.	Percentage cultivation.	Order of density.	District.	Population.	Number per square mile.
1	Prome	2,225	284	12·76	1	Prome	257,157	115
2	Myanoung	4,150	450	10·84	2	Myanoung	444,750	107
3	Rangoon	9,800	774	7·87	3	Thayetmyo	132,604	40
4	Thayetmyo	3,275	155	4·73	4	Rangoon	373,078	38
5	Bassein	8,954	354	3·95	5	Bassein	316,833	35
6	Amherst	15,144	346	2·28	6	Shwegyeen	144,919	14·10
7	Tavoy	7,200	96	1·33	7	Tonghoo	78,430	12·34
8	Shwegyeen	10,272	131	1·27	8	Amherst	235,738	11·89
9	Tonghoo	6,354	55	0·86	9	Tavoy	71,494	9·92
10	Mergui	7,760	66	0·85	10	Mergui	46,184	5·95

It has increased from 1,897,897 in 1861-62 to 2,395,985 in 1868-69, and from that number to 2,562,323 in 1871-72, or 35 per cent. in the last 10 years. Of the total population, 2,159,566, or 84 per cent., are agriculturists, and the remaining 402,757 are of other occupations and trades.

Where the villages are numerous, the forest area must be so arranged as to leave ample room for expansion, and leave also sufficient forest land for their own wants.

Population in the hills.

106. There are also in the hills Karen and other settlers who require land in which they may clear toungyás and so forth. Fortunately, however, as regards the Pegu Yoma and the Western Yoma hills, these tribes generally affect the second ranges or those intermediate between the Central Yoma crest and the lower undulating series that abut upon the plains, and therefore the reservation of tracts in the interior or crest range is, as a rule, unattended with difficulty.

Forests in parts inhabited by Karens.

107. The forests in the second range of hills have only to be so arranged as to leave considerable areas for the cultivation of the Karens and in the west, of the Chins; as these Karens are always good foresters and useful people, peaceable and ready to obey the forest rules, there is no fear that the existence of their "Tays" or villages near the reserved forests will be other than beneficial; and it is found convenient to encourage them by the free run of the forest for their own actual wants in the way of produce, saving only valuable trees, which, as a rule, they never require.

Karen villages easily moved.

108. When such villages are found in the midst of a reserve, it is a matter of very little expense or trouble to shift the naturally moveable and almost nomadic village to another site. The people only require compensation for the expense of renewing their bamboo huts, and even this removal is only occasionally desirable; the villages may often be left inside the reserve, with a suitable quantity of land all round them, and the purposes of the "ordinary reserve" are not interfered with.

109. This is even more true of the vast ranges of hills along the Salween. The higher hills here are covered with evergreen or moist forest, and are hardly if at all populated

Hills to the north-east of Tonghoo.

110. In the hills to the north-east and east of Tonghoo, the higher and inner ranges of hills are claimed by the inhabitants. When the area of the present cinchona plantation on the higher range (3,700 feet) at Thau-toung-gyee, north-east of Tonghoo, was taken up, the inhabitants claimed the right of the whole of the forests as being tracts in which their forefathers cut toungyas, and to which they returned in rotation after long intervals; the claim was disallowed, but practically they were only affected by the small area of a few acres taken up. No attempt has yet been made to reserve any forest in these ranges, and it remains to be seen whether such a course, if desirable, would be possible. At present the extremely long rotation from 20 to 40 years of the toungyas gives the forest time to grow up again, so that its character as high forest does not immediately give way, but the tendency of all toungya grounds is to deteriorate gradually, and when the period of rotation is shortened, as it soon is with the increase of population, the deterioration is rapid, *e. g.*, the lower hills of East Prome.

Claim of the inhabitants disallowed, but never practically infringed.

Length of rotation of toungya diminishes the damage.

Ordinary reserve will be inside the Eng belt, and in cases of necessity include it.

111. As a general rule, the ordinary reserve will be on the inner side of the Eng forest toward the Yoma, and will, in future, include portions of the Eng, especially when the denudation of it seems impending.

The forest outside the "Eng."

112. The forest beyond the Eng again, towards the plains, will be more difficult to deal with as regards population. I recommend that as a rule this forest should be entirely given up for the purposes of 'district forest,' of which I shall speak presently. It is only in exceptional cases that forests in this part of compact formation and good growth of teak coupled with facility of export, attract attention, and in those rare cases limited areas will have to be reserved specially.

Measures necessary to maintain "ordinary reserves."

113. The ordinary reserves will require but little attention for their maintenance in such a state as will serve their primary climatic purpose.

Toungyas to be prohibited.

To prohibit absolutely toungya clearing will be the great thing; and this once done, it will become gradually more and more easy to prevent fires. Already these fires are rare in the higher hills, where there is no population.

Conservancy of "Eng."

114. The Eng forest is remarkably easy of conservation. Though a slow-growing tree, the *Dipterocarpus* produces naturally a vast crop of seedlings whose huge glossy green leaves cover the ground. The leaves grow smaller as the tree advances in age.

Lesson to be learned from the *Dipterocarpus* forest.

115. The growth of these forests ought to read a lesson to those who still murmur that forest fires are good things, if indeed such persons can be reasoned

with at all. The Eng tree seeds *after* the season of forest fires and just before the rains, the consequence is that the seed not being burned as it lies on the ground, an abundant and uniform crop springs up and covers the ground. The large leaves suppress other vegetation, and by the time the fire season comes round the seedlings have already nearly a year's growth of large moist leaves, while the inflammable material being of minimum quantity and of light texture, the fire when it does pass causes much *less* damage than in other forest. Not that the fire ceases to be a very great evil, for the young plants are often destroyed in great numbers, and the survivors grow slowly and have to struggle year after year with the fire. Still, comparing the tracts of Eng which I have often seen covered with large leaved yearlings, quite like a cabbage garden, it must be admitted that, with a protection against fire, natural reproduction in an Eng tract would leave nothing to be desired.

Effect of forest fires compared with other forests.

116. The valuable trees in these ordinary reserves are placed under protection, so that the barbarous practices of felling "thitsi," the black varnish tree, for charcoal, cutting down whole trees of *Careya arborea* (bambway) and others for the sake of picking the leaves for cigarette wrappers and such other practices may be put a stop to.

Preservation of valuable trees in ordinary reserves.

The same general protection will enable the forest officer to regulate the extraction of wood-oil from the kanyen and other species, the collection of varnish from the thitsi (*Melanorhœa*), the collection of bees'-wax, honey, and other products, the manufacture of cart-wheels, axles, and boat hulls, without that frightful waste of material with which these operations are now invariably conducted.

117. At the same time the revenue of the State will be increased, and there is great need so to increase it, as the serious and earnest work of forest regeneration now to be entered on will possibly entail a diminution of outturn of teak for some time, and probably an increased expenditure for an efficient establishment for works of plantation, &c. But the increase will not be gained at the expense of oppressing the people. It will simply touch those people who make a gain out of products of this sort, and can, therefore, afford to pay. The local villages near the reserves, and the villages in the plains, are expressly provided for. The reservation will merely cause the proper rule in such matters to be adhered to, *viz.*, that if free forest produce is allowed, it is so for the use of the persons taking it, and not to enable them to make a mercantile profit.

Increase of revenue.

Thereby touches the people who make a mercantile profit out of the produce.

118. And then there is the preservation of teak to be attended to as explained in paragraph 102 *ante*. Until the special reserves are in a condition by themselves to yield the whole supply of the market, the existing stock of teak must be religiously preserved, and the working plan will still count on this stock exactly as that of 1868 did, but of this more will be said hereafter.

Stock of teak to be kept up.

B.—Extent of Special Reserve.

119. The special reserves will generally, but not always, be inside the ordinary reserves. They are special portions of the best forest set apart to undergo careful treatment to be converted into teak or other forest, probably not pure, but together with some other tree like the oak and beech forests in France. They will be always selected with careful regard to export lines and to there being a suitable soil for the forests required to be converted, restored, or created. Where they are inside the ordinary reserves, their constitution is obviously very simple. Where they are outside, as in the case of fuel reserves along the Prome road, "kuch" reserves, and the valuable forests *outside* the Eng tract, they have to be carefully considered as regards rights; but a few tracts have already been reserved in those localities under the old procedure, and no insuperable difficulty was found.

Special reserves.

120. Great care must be exercised in selection of the places. They are destined to form the permanent valuable timber and fuel and other produce-yielding forests of the country. We are thus gradually to contract the area of yield, relaxing our supervision over the ordinary forests and increasing and perfecting it over the special reserves till at last the ordinary reserves will require only efficient patrolling, while the whole strength of our work is concentrated on the special reserve.

Care necessary in the selection.

121. It is not possible in our present state of knowledge to indicate the ultimately required area of such forests.

Precise area of special reserve cannot be indicated.

Present out-turn.

The present annual out-turn of Government forests in teak alone, as averaged in the eight years from 1860-1868, was 22,000 tons, equal to 1,200,000 cubic feet. Taking the out-turn between 1866 and 1871, or for the last six years, it was 44,300 tons in round numbers.

Ought to be produced on less than one-twentieth of the present area.

This quantity in a regular forest, producing an average annual growth of 40 cubic feet per acre (a very low rate), would be yielded by 43 square miles, or 27,500 acres, of forest.

Failure of foreign supply to be looked for.

But in time the supply of foreign timber that now helps to stock the market must fall off. Rich as the forests are, they cannot survive for ever the effects of felling conducted without principle and with reproduction left to chance without a single element in its favor; and this result is likely to happen even before our special reserves have grown up, so that by the time they are workable the chances are in favor of a much greater demand upon the State resources.

Digression regarding the Western Karennee forests.

122. It is true that the Western Karennee forests are open to us, and even urged upon us by the ruler. If the opportunity were seized, it might render the forest future perfectly safe as regards teak supply. In other parts of the Indian empire we have seen such forests leased to the British Government, and the management of the country effected by the aid of a sensible and judicious Resident or Superintendent, with the happiest results, and to the manifest benefit both of the rulers and ruled. Beyond, however, prominently inviting attention to the fact that these forests are known to be workable and of great extent, and that it is only the lax state of the local administration and the insecurity caused by the interference of the Eastern Red Karens that has prevented the exploitation of these forests, I cannot venture any further on a subject which has possible political considerations connected with it that I must necessarily be ignorant of.

Considerations affecting the area of special reserves.

123. Returning from this brief digression to the area of the special reserves: though the precise area to be ultimately desired is not known as yet the limitation of the area at present is made for us, partly by considerations of an economical nature, and partly by physical circumstances. And first and foremost we cannot attempt a larger area at present than can be thoroughly and efficiently protected and cultivated to that degree of intensity which is permissible with reference to the expected return, and to the objects, other than cash income, which the State has in view in the maintenance of timber-yielding forest, and therefore regards as equivalent to cash income.

Practically also establishments very disproportionate to income do not get sanctioned.

124. Our establishments and working expenses on cultivation and measures for protection and improvement must also in practice bear some sort of equitable relation to the existing yearly income, or we shall never induce any Government to sanction them, and we must not try to do more with our establishment than it can efficiently undertake. We must therefore be ready to give up freely, either to such general preservation as the ordinary reserve supplies, or to district use, all outlying forest that is not well situated and all that is not first class in its way.

Disinclination to give up forest land.

125. It is of course a painful thing to a forester to relinquish his hold on a forest; his tendency is to cling to every little group and patch of teak in the country and reserve it. Such a tendency must be resolutely overcome.

Excellence required in the forest for special reserve; also limits the area.

126. We must confine the "special reserves" to compact areas (1) of existing forest only of the *very best* growth, both as to form and quantity, especially having trees of the middle-age classes *coming on*, and (2) places which, though the forest has been injured or destroyed, have still an excellent soil and exposure, and are capable of successful restorative treatment.

And we must have the forests in a good position for export.

Importance of working only on the best.

127. The latter conditions are of the most first-rate importance. Even the best of our reserves will be only partially stocked, and our work will be to convert them in most cases into mixed high forest with teak or some other valuable tree uniformly dominant. It is absolutely *no use* trying to do this, except where the conditions necessary to success already exist; we cannot spend money on 'forlorn hopes.'

The area will in fact be all we can get to answer to stringent conditions.

128. Limited then by these natural and economic exigencies, we may safely go to work to take out the very best areas known to exist in each division. *If* these in the aggregate appear too great, again eliminate and devote ourselves to the best worth treating *of* the best, the "*crême de la crême*" in fact.

129. Such, then, briefly indicated, are my proposals for securing the forests to be managed by the Forest Department, and objects to be obtained, and the sort of work which they will demand.

But these "ordinary" and "special" reserves do not meet the whole case.

C.—District Forests.

130. But there still remain large tracts of forests in the plains, large portions also of the forests of the lower hills *outside* the Eng tracts, and these, together with the unreserved hill ranges in which toungyas are cleared, constitute an enormous area of forest land which is open to be dis-forested and brought under cultivation. At present this land is disposed of to settlers by small grants made wherever asked for.

System of bringing forest land and waste under cultivation.

The rules for the sale of such lands in large blocks, which are to be found at pages 188-228 of the "Hand-book for British Burma," have, I understand, been repealed or suspended, and only those provisions of the revenue rules, No. 11 (*vide* page 151 of the hand-book), which give the power of making grants from 5 acres to 100 acres at a time, are in force. The smaller grants are made by the Thoogyees or revenue officials in charge of a "circle" or sub-division of a township. The 100-acre grants are made by the Deputy Commissioner.

Reservation of land from cultivation.

131. It would seem, however, that the locality of all such grants is restricted by the "list of lands reserved" (page 209 of the hand-book), which protects the land from clearance within a range varying from 2 miles to ½ a mile from existing towns and villages in the several districts.

Existing villages how supplied with forest produce.

132. All existing villages are therefore dependent for forest produce on these tracts; but nothing is done to protect them. What they cannot get from these jungle tracts they go for to the nearest forests at the foot of the hills, and thence they fetch boat hulls, bamboos, and so forth. Bees'-wax and honey collecting are in some places leased out, but the use of the black varnish, the cutch, the wood oil, and many other useful products are totally unrestricted.

Time has come to take care of these village forests.

133. It seems clear that the time has now come when some care should be taken of these tracts of land and of these valuable products. I earnestly deprecate putting off the question any longer. The time when jungle land is abundant is the time when arrangements can be made; afterwards when it is destroyed, it is too late.

Surely with the example of most of the Indian provinces before our eyes we are not to let things drift on uncontrolled till the day of opportunity has gone by.

All that is wanted at first is a very general control—the first elements of a management that hereafter may become systematic.

Elements of a system wanted at first.

134. All existing villages are known to have forest land or to derive their supplies from some place in the vicinity. These places should be described as "district forests;" a very simple system should be introduced whereby the village headmen and revenue officials should exercise a control over the forest and prevent its being abused or wantonly wasted.

Influence of district officers.

135. This could be done by district officers, who could explain to the people what the object was, would point out to them how rare good trees are becoming for house-posts and other purposes, and who would, at the same time, make them understand thoroughly that there was no design to limit their own personal use of wood and fuel and produce, but only to provide efficiently for a future supply, putting a reasonable price on valuable woods and on articles which are exported for sale, so as to form a fund for district planting and other purposes, to be laid out strictly for the benefit of the district.

New villages to be provided for.

136. Where new villages are being formed, the grants of land can be so arranged that provision is made for forest land for the new village.

Necessity of forming some idea or general plan of location of villages, forests, &c.

137. In short, what is wanted in the way of district forests is for us to stop drifting along, and take a view of the position. District officers should form a sort of idea or general plan as to how the villages are to be provided for, and then (1) taking such steps as may be best to begin with, in the case of lands already much interspersed with cultivation; and (2), in the case of still uncleared areas, arranging some outline of a plan as to the order or direction in which land shall in future be given up, and where district forest area shall be maintained.

Could be done without discouraging settlers.

138. That this could be done without in the least checking or discouraging settlers I firmly believe. If the purpose is fully explained, and any changes that are introduced are so through the agency of the people themselves, and introduced cautiously and gently, they will be acquiesced in, if not appreciated, at any rate, by the leaders of native society.

Management of forest produce in districts.

139. As regards the management of wood oil, varnish, and so forth, this might perhaps be best arranged by dividing the produce out according to circles or townships, and leasing the right to collect wood-oil, &c., for a term of years, the lease being sold by auction or on such terms as the district officer thinks best in each case.

These leases will have the effect of stopping (which should be done absolutely) the cutting down of thitsi trees, and would also make it the lessees' interest to extract wood-oil in a more reasonable way, so as not to destroy the tree, and a check would be placed also (which is very desirable) on cutting down the kanyen trees, which yield this product.

Cutch trees in district outside the Forest Department reserves.

140. In the case of *cutch*, the best compact tracts will have been taken up as reserves under the Forest Department, but it would still be necessary to put some fee on the utilizing cutch in such outlying places as are not reserved, or else it might prevent people coming to the reserves. This I understand the new revenue law will effect.

Scarcity of valuable woods.

141. There is another point which deserves attention; there is no doubt whatever that the supply of valuable trees is diminishing. The frightful waste described in the first part of this report, and the fact that people get accustomed to be careless with what costs nothing, and what no one is bound to look after, has resulted almost in the extermination of valuable trees in some places.

Customs of the country cause perpetual demand for wood.

142. The habits of the country demand above every thing wood for house-posts and building, nor is it likely that these customs will change. Lime in many parts is costly and rare; brickwork also, as it seems, is unsuited to the climate. A country whose surface drinks in from 6 to 17 feet of water in its annual monsoon, requires that the houses should be raised above the floods, the thick mud of alluvial clay and the miasma of fever. But house-posts are nearly always taken from young trees just of a size to give the required girth. Hence, many young trees are stopped in their very midway growth. In my opinion great efforts should be made to introduce the use of sawn posts, by which three or four mature trees could be utilized instead of a dozen young ones being felled.

Use of young trees to save trouble in sawing.

There is no reason assigned for preferring young trees; the cause is laziness, pure and simple. I beg here to call attention to the growth of the shah or cutch tree for house-posts. While "pyingado" takes a very long time to grow, and is not always easy to rear, cutch, if in a district with suitable soil, grows abundantly and much more rapidly. A small area of suitable soil slightly loosened and sown with seed will soon have a dense cover, and when this is the case I have no objection to seeing round house-posts taken out, because under such circumstances it may on the whole be more profitable to grow house-posts in the same way that it pays in Kent and elsewhere to grow larch for hop-poles only.

Scarcity of valuable trees. District planting of valuable trees.

143. But however this may be, the scarcity of the more valuable trees, pyingado, pyimma, padouk, and many others is notorious, and it would seem quite possible to encourage the planting and growing of these species. They could be introduced into portions of the village forest, or special nurseries and plantations of these may be formed. The last plan is certainly worth trial, and would, I think, succeed if payment was made to the successful cultivators; at least we might try.

Protection of strips of forest along streams, &c., &c.

144. Lastly, the district officers should take steps to protect strips of forest along the banks of streams. Of course in many cases forest still fringes the bank, which is infinitely better than the useless "kaing" grass, and steps should be taken to prohibit the destruction of the trees. Around "zaiyatts," wells, "zedis," &c., groves often exist, and need nothing more than a prohibition against destruction.*

* The "zaiyatt" is the public rest-house everywhere met with in Burma. Burmans regard planting trees for the public benefit as an act of religious merit.

145. Roadside avenues also should be considered. We have now lines of road like the Pegu road, the Prome road, that to Tounghoo, and from Tounghoo to the frontier, to say nothing of many district cart tracks that have either become, or are rapidly becoming, permanent roadways. Roadside avenues.

It is surely not premature to see to the preservation of the natural shade, and even planting along the permanent roads.

146. In Eastern Prome, where cart tracks of a more or less permanent character are numerous, it is distressing to travel even in January. The repeated cutting of toungyas close up to the very roadside has destroyed every vestige of trees, and there is nothing, sometimes for miles, to break the glare of the sun reflected from the hot white soil, and nothing to alleviate the clouds of dust that suffocate the traveller. A simple prohibition against cutting trees within a certain distance from the road would do much against this.* Roads in Prome given as an instance.

147. Recapitulating the wants of district forest, we have the following; and if it is thought that all cannot be taken up now, at least I urge taking up some:— Recapitulation.

1.—District forests for village supply (chiefly existing and only requiring to be reserved in giving out grants of waste land).

2.—Avenues (existing trees or new ones planted) along roads; groves (often existing) near public places. A simple rule for prohibiting cutting would do a great deal here.

3.—Strips of forest along streams—the same remark applies.

4.—Plantations to be made, if possible, under the direction of revenue officials, who would receive a commission on a certain area planted, or number of young trees successfully reared, on the certificate of a visiting forest officer as to the satisfactory state of the work.

In writing the above remarks, I am not insensible that the proposal to form district forests has received much opposition. But come it must some day; it is perfectly inevitable; and *then* it will be done, imperfectly, with great difficulty and with much heart-burning. It will be observed that my rules and proposals are extremely elastic, and very gentle in their operation. The entire administration is in the hands of district officers only; all rates and fees are purposely left undetermined that full scope may be given to very light charges and to the adoption of the most inoffensive form of imposing them. This latitude gives every guarantee that can be demanded as a safeguard.

* Here I would take leave as a traveller to offer a suggestion about the maintenance of the tracks. In Tounghoo district something of the kind is already done, but in other places apparently not; why should not the headmen of villages be required to keep these tracks open for a certain distance till another village takes it up, and so on? Yet frequently the fall of a tree will block up a track, and then, it being no one's business to remove it, the track is diverted in another direction, causing the roads to straggle over the country, to lose their definite direction, and become unmanageable, and often almost impassable. A very little management and a very little expense would maintain the principal tracks clear and open and moderately direct in course, to the immense saving of time and trouble in moving about, facilitating the movements of the police and other inspecting officers to a very great extent.

SECTION II.

THE TREATMENT OF THE FORESTS AND THE REVISION OF THE WORKING PLAN.

The present working plan.

148. This year, 1873, is the last of the five years the yield of which the working plan lays down.

149. The working plan of 1868, as it stands, assumes the permanent existence of the whole 1,981 square miles of teak-producing forest. Estimating its contents (dealing with teak only) according to the then existing information, the material which could safely be taken out in five years without trenching on the capital was fixed. At the end of the fifth year (1873) it contemplates a revision of the valuation estimate by the light of such additional surveys as have been made during the currency of the period, and a re-determination for five years more of a yield-table, which may either be greater or less than that of the previous quinquennium, according to the results of the surveys alluded to.

Revision in 1878.

Reproduction.

150. Plantations, assumed to be made at the rate of not less than 350 acres per annum, were not taken into calculation in the yield, but reserved as a means of increased future yield.

Prospects of aided reproduction warranted a liberal yield.

151. The probable success of plantations, however, and the probable increase in production of material expected from the progressively better management of the area of 1,981 miles (some of which was to be reserved so as to place such better management beyond question), were taken to justify adherence to the most favorable existing estimate of proportion of age-classes in the existing forests.

Rotation and material of exploitation.

152. The rotation was fixed at 160 years. During the first 100 years of the rotation the material of exploitation would be—

(*a.*)—All 1st class trees (160 years).

(*b.*)—All 2nd class trees $\frac{8\,8}{1\,6\,0}$ years, the smallest of which would be mature in 72 years from date.

(*c.*)—Four-tenths* of the 3rd class trees (60 years), which would require 28 years to reach 2nd class size and 72 more to reach the first class size, or 100 years from date in all.

Working division of the forest.

153. The forests are treated by 'blocks,' of which there are five, each working block corresponding to the administrative division:

1.—Rangoon,	8	forests or compartments.
2.—Tharrawaddy,	10	„ „
3.—Prome (East)	7	„ „
4.—Sittang	12	„ „
5.—Salween	10	„ „

The sub-division into compartments.

154. The existing areas, as locally known by one forest name (in excepted cases two or more are grouped), form the 'compartment,' which may thus vary in size from 4 square miles in the smallest to 135 square miles in the largest, giving an average of 42 square miles. The working plan is to all intents and purposes separate for each "block," as the annual yield of each goes on simultaneously. A statement (No. 3) appended to the working plan shows the distribution of the five years allowance over the 'districts' (compartments) of each block. For this purpose certain compartments are selected in each block for working. In some cases a single compartment is worked in each year of the five, as in Rangoon.

The plan separate for each block, as the yield of each goes on simultaneously.

Rangoon Block. Compartment.	Area in square miles.	Yield in 1st Class Trees. 1869.	1870	1871.	1872.	1873.
1 Bonee	45	.....	4,000	.....	.....	.....
3 Zamayee South	100	.....	.....	.....	.....	2,000
4 Pounglin	40	.....	.....	2,000	.....	.....
8 Thoongzai	50	2,000	.....	.....	2,000	.....

* The 3rd class ranges from 19 to 88 years, of which $\frac{7}{2\,5}$ = 0·4, are 60 years old.

In other cases, two compartments are worked for the same year, but no block has more than two compartments worked in the same year.

155. The selection of these compartments to be worked in the five years was determined by the requirements of each district, as derived from the Taxator's general knowledge of their conditions and resources; and the order of cutting in these five years was regulated apparently by convenience, so as to bring on the girdling of those tracts last which had a supply of dead and fallen timber or the remains of former girdlings available to be worked out before new trees were girdled. Section of compartments, and order of felling how determined.

The girdling or killing of trees for felling was to be done by the officers of the Forest Department.*

For reasons stated at pages 12 and 13 of the plan, within the number fixed, *all* good marketable first-class trees were to be felled.

156. This, of course, assumes either that the number of unmarketable trees and second class trees are sufficient to shed seed, or else that practically we do not require more seedlings on the ground than we have at present, or shall have before the period of felling comes round, and we are thus making a sort of "definitive felling"—a last felling in the series. Exceptions are, however, made in the case of trees standing solitary and trees near streams, which, as a rule, are scarce; such places have been eagerly seized on for felling in days past on account of facility of removal. Teak in deserted toungyas is also reserved. Assumption made as to reproduction by seed-shedding.

157. This is the actual working plan. There are other sections devoted to surveys, to reservation, and to plantations, but no order of work in these directions is indicated, only the general principle suggested. What else the plan contains.

158. It will be an additional argument in force of the proposals for classifying forest to observe that the paragraph 7, section 5 (which I had not read till after I had formed my ideas on the subject from seeing the forests), suggests the same thing. But contemplates the new proposed scheme of "special reserves" for systematic treatment.

159. During the five years of the working plan, valuation surveys were carried on, and the results have been annually published in a "Statement I," which is uniformly appended to the Annual Reports for 1868, 1869, 1870, 1871. The 1872 report is not out yet. Additional valuation surveys made during the period of five years.

160. These statements are not easy to be understood by the uninitiated, owing to the total want of a definite division and sub-division of the forests. "District" was intended to mean the whole of a forest that went by one local name, and "sub-district" should be a local sub-division of that forest. But sometimes there is an intermediate division; thus, in Prome, we have the Boolay "district," and also the Choung-goung-gyee, which is a 'district' of the Boolay 'district,' and then the Boolay has its sub-divisions besides. Value of the estimate statements.

161. The results of all these surveys do not tend to alter the amount of yield in the ensuing quinquennium. The results obtained.

162. Plantations have been carried on, and artificial reproduction may be certainly said to be an established success, if the locality and soil is properly selected. Plantations *i., e.*, artificial creation of forest.

We may put aside the "Experimental Plantations" as being of no use for yield purposes, though as experiments they have served their purpose. Experimental plantations.

They are as follows:—

			Acres.	R.	P.	
RANGOON	...	Rangoon (1858) ...	5	0	0	Immaterial what is done with it.
THARRAWADDY	...	Myodwin (1862 to 1864)	10	2	39	Nice little groves; should be made over to district as village forests.
		Kāngyee (1865) ...	12	0	0	In the reserve.
SITTANG	...	Kayenchoung (1865) ...	10	0	0	Should be abandoned.
PROME	...	Prome (1865 to 1868)...	66	2	0	Should be maintained as a place in which experiments can continuously be made, rate of growth observed, &c.
SALWEEN	...	Thingánenoung ...	10	0	0	Immaterial what is done with them.
		Shooaygoon ...	5	2	0	
		Koloon Island ...	2	0	0	
		TOTAL ...	121	3	0	

* The records teem with papers on the question as to who should girdle—the purchaser or the department—a point discussed and minuted on with a zeal and exhaustiveness worthy of a better cause. As long as the work is done by selection cutting (jardinage), the idea of leaving that selection to be done by the purchaser (whose sole interest and object is to get trees of the maximum value and quality at a minimum outlay for removal) would be regarded by a European forester as too absurd to be seriously entertained at all.

Permanent or yield-plantations.

163. The permanent plantations are—

			Acres.	
RANGOON	...	Kyépyoogân ...	683·5	(Mentioned afterwards).
THARRAWADDY	...	Choungwâh (Boben) ...	340·0	Comes into reserve.
		Kyúe-má-Kaing (Kadin Beeling). ...	144·0	Ditto.
SITTANG	...	Kannee ...	70·0	Would give it up or leave as district forest.
		Thoukya-ghat, or (Pyoonchong) ...	644·78	Will perhaps come into reserve.
		TOTAL ...	1,882·28	

Working plan area realized.

164. This shows that the working plan idea of 350 acres annually has been realized, but not at a cost of Rs. 30. (Working plan, paragraph 14.) Thus, gleaning the results from the table D in the Annual Report, 1871-72, we have—

Cost of plantations.

Names of Plantations.	Acreage.	Cost up to 1871-72.	Return up to 1871-72.	Nett cost.	Average.
		Rs.	Rs.	Rs.	Rs. A. P.
Kyépyoogan	683·5	40,789	1,449	39,340	57 8 10
Choungwâh	340·0	33,316	244	33,072	97 4 4
Kyúé-má-Kaing	144·0	14,511	...	14,511	100 12 3
Kánnee	70·0	1,373	...	1,373	19 9 10
Pyoonchong	644·78	18,980	1,027	17,853	27 13 8
TOTAL ...	1,882·28	.....	...	1,06,149	56 5 3

or a general average nett cost of Rs. 56-5-3. The tendency of late years has been to reduced expense and increased income. Thus the return on Kyépyoogan rose from Rs. 116 in 1870 to Rs. 1,259 in 1871, and the cost of formation and maintenance per acre in the same plantation, which was Rs. 87 in years up to 1869-70, fell to Rs. 63 in 1870-71 and to Rs. 40 in 1871-72.

Reservation of forests.

165. The reservation of the forests has been carried on with the result shown by the following table. It should be observed that both in the Prome and Tharrawaddy divisions, proposals have been submitted for the reservation of great blocks in the Yoma, which will have the effect of including in one group or general reserve several of the forests now shown as separate reserves. The table does not include the proposed reserves of catechu trees (Shāh, *Acacia catechu*).

RESERVED TEAK FORESTS.

Prome District (Civil).

Number as marked in the provincial Map.		Acres.	Total.
1	Gwaycho	6,720	
2	Myoungben Tsway	3,072	
3	Middle Khyoung Zouk	2,880	
4	Upper ditto	3,456	
5	Oopanlaygyee	1,362	
6	Oopanlangalay	515	
7	Yeytha	403	
8	Shwe Kyun Dau	238	
			18,646

Myanoung District (Civil).

1	Padet Myoung	4,160	
2	Daulay	1,760	
3	Kyoukyee Doung	2,560	
4	Shaboung	2,229	
5	Bwet...	2,887	
6	Upper Padinben	560	
7	Lower ditto	241	
8	Upper Tapan	1,015	
9	Lower ditto	675	
10	Kannee	768	
	Carried over ...	16,855	

Myanoung District (Civil)—Continued.

Number as marked in the Provincial Map.		Acres.	Total.
	Brought forward ...	16,855	
11	Pazinjay	1,280	
12	Nyanlay	5,840	
13	Toungnyo Hill	3,520	
14	Upper Payagyee	1,041	
15	Lower ditto	572	
16	Thitcho	1,414	
17	Gway-douk-tsán	1,306	
18	Choungwah	744	
19	Kangyee	3,801	
20	Mokkha	7,200	
21	Kadin Beeling	6,880	
			50,453
	Tonghoo District.		
1	Thoukyaghat	3,519*	
			3,519
	Salween District (Civil).		
1	Tsinsway	8,960	
2	Moochoung	2,200	
3	Wah Moo Choung	1,760	
			12,920
	FUEL RESERVES.		
	Rangoon District.		
1	Between the 39th and 42nd mile stones, Prome road ...	1,689	
2	Ditto 43rd 47th ditto ditto ...	1,601	
3	Ditto 50th 55th ditto ditto ...	5,087	
			8,377
	Myanoung District.		
1	Tsapoke	11 square miles.	
2	Tseetqueng	8 ditto	
3	Choung Nagoon	2 ditto	
		21 ditto	
	TOTAL RESERVES		167,742

166. Some of the smaller reserves have been on hand sufficiently long to show that on the whole the first efforts to keep out fire have been by no means without success, and toungya cultivation, as such, has been entirely repressed in them. But the area is not always satisfactory, and is not selected on any principle. Some of the reserves are too small, and it is to be borne in mind that the recent proposals now actually before the authorities for the massing of the reserves *alters the whole* contour of the old reserves. Efforts to keep out fire.

One thing is certain, if my proposals for ordinary and special reserves are correct, the whole of the old reserved area will have to be reviewed and reconstituted on those principles.

167. I should not forget to add that a perusal of the reports, not only since the working plan but before it, shows that one branch of work has been well attended to—the clearing of streams by parties in charge of blasting operations.

Operations, on the other hand, for what is called 'Forest improvement' —clearing young teak trees and cutting creepers—have been equally desultory and unsatisfactory. Work was carried out, not by areas, in pursuance of any scheme, but in a general sort of way, and it is actually recorded in several years that so many thousand creepers were cut and so many thousand young teak cleared in the whole province! What is learned from these figures it is not easy to say; I have not thought it worth while to tabulate such material. Forest improvement so called.

168. Such is a summary of the existing working plan and of the progress made during the five years of its currency.

169. I have now to offer some suggestions for the next working plan. Suggestion for new working plan

* Teak plantation included.

Two plans required. (1) For ordinary reserves.

170. In the first place, we shall now have to take in the whole of the forest, western as well as eastern, and we have to deal with two classes of forest. First the large "ordinary" reserve blocks maintained primarily for climatic purposes. A very general plan will at present suffice for them. The teak will have to be taken out of them as hereafter indicated, so that a yield table has to be prepared. The material of exploitation, when once constituted in the special reserves, the *yield* of the ordinary reserves will only be of local and limited importance.

(2) For special reserves. First considered.

171. The second and most important working plan, however, is that of the special reserves. With this I propose to deal first.

I assume that the 'very best' of the whole forest area has been selected; but the 'very best' is only relatively so: it is only so by its good soil, its position, and so forth—by its *capability*, in short. As it is—even the best of it—it is irregular, has been badly treated, and has a limited number of valuable trees per acre.

The general principle of the plan for pecial reserves.

172. I would propose to adopt, as my starting point, a general ideal or principle for this plan, which is:—"Having selected the 'most capable' of our existing forest (whether teak,* pine, thitkado, or whatever it is, pure or mixed) now in the condition of *irregular high forest worked by selection cutting* to *convert* it into regular high forest to be worked (when its material or capital is constituted) either by clear cutting with artificial reproduction, or by serial cuttings on the natural reproduction system, as may be determined."†

173. I have already indicated the object of the special reserves, and the definition in the new code of rules places it, I hope, beyond doubt; but the matter is so important that, at the risk of being tedious, I recapitulate that selection of the Special Reserve as the most 'capable' must comply with the following conditions:—

(*a*). That the extent is sufficient for satisfactory treatment—not too small, for we cannot work an archipelago of little groves; not too big, or we shall not be able to supervise every part efficiently.

(*b*). That the material produced is valuable, or has been so before abusive exploitation, and consequently, if conditions *c*, *d*, *e* concur, is capable of being restored.

(*c*). That the means of access and export are satisfactory, or can be made so at a justifiable outlay.

(*d*). That the soil, exposure, &c., are such as our existing knowledge (which is satisfactory on the point) shows to be suitable for the growth of whatever we intend to raise;‡ in short where these elements of success are *primâ facie* visible.

(*e*). (Connected with the last) that not only will the soil produce the species required, but will produce it of good form and shape as regards the bole, height of branching, &c., and also produce it at a *fair rate* of growth.

The mass of descriptive material *ought* to enable us to make the selection with confidence.

174. If the huge mass of descriptive reports and the piles of valuation statements that have been drawn up between 1854 and the present time have not put us in a position to make at any rate a *primâ facie* selection (to be verified in detail before the plan is laid down) of those tracts which are to be *par excellence* our area for forest work, we shall, I am sure, never be in a position to make the selection at all.

175. Some considerations affecting the area of special reserves have been stated at paragraphs 128-128 *ante*.

Area required already discussed.

176. If we had even 43 square miles, as before observed, stocked per acre as Mr. Brandis gives it—

350	trees	15	years' age	1·5′ girth.
90	„	55	„ „	4·5′ „
60	„	80	„ „	6·0′ „

and at the rate of 40 cubic feet per annum growth, we could maintain the *present* outturn; so that if we had distributed over our five divisions (or six

* The time has come for putting down the teak mania with the high hand.

† I expect it will be the latter, but it is useless to look so far.

‡ I do not mean that the soil must be *uniform* all over so as to grow one species, but it may suit teak in parts, and other parts may raise the valuable *Bambusa gigantea*, or the *Pyimma*, &c. Take the Magayee reserve for instance. Parts are suited for teak, but it is no use attempting teak on the low-lying lands near the stream; here grow Pyimma or some other useful tree. *Small* blanks or bad pieces are no harm, rather the reverse; they make breathing spaces.

with Western Prome), say 250 square miles = 160,000 acres of compact forest, we should have an out-turn of at least 128,000 tons or 6,400,000 cubic feet, which is more than equal to the average out-turn of British and foreign timber together, for the last six years.*

Steps preliminary to the working plan.

177. Having obtained our general indication of the special reserve tracts in each forest division, a topographical survey must be made of those reserves.

Survey absolutely essential.

178. There can be no halting between two opinions here. Without such a survey we want the very foundation of all orderly work, of all systematic progress of getting a regular quantum of results which are the worth of the money spent in each year.

The general order stopping surveys.

179. No one can doubt the wisdom of the general order by which the Government of India stopped expenditure on surveys and placed the work under one special department.

Conditions here totally different.

180. But the case of Burma is exceptional, and its need is urgent; if it is essential to take up the work in parts of India at once, so that Burma cannot be taken in hand, then Burma must be made an exception; nor can there be any reasonable objection to this.

Claims of British Burma. To refuse survey is to prevent the very economy the order designs to secure.

181. Burma is the best paying forest province we have, and it is militating against the very economy which the rule was made to secure, if we check it in its course.

We *cannot* begin the proposed re-organized system without a survey.

Argument in favor of it.

182. Besides the necessity, we can prove to the Government of India that there will be no waste.

Its extent and cost definite.

183. We can show the exact places and the estimated area we want to survey, and show the amount it will cost to survey it.

We can show also that we *have* the means to carry out the survey properly.

The difficulty about the Topographical Survey Department using our data will not arise.

184. We can show further, that the survey of a limited area like this cannot affect the general topographical survey of the country, and therefore that the question much insisted on in the survey resolution regarding the uniformity of method and the acceptance of our results in aid of the general work of topographical survey, so as to prevent the same ground being gone twice over, do not apply.

No survey, the whole plan must fail.

185. If a survey does not take place, the whole of my plan necessarily fails; without a survey we cannot have a subsequent 'parcellaire' or division of each forest into compartments according to age, growth, and soil; in short, that analysis or inventory of the forest, by which the portions which are homogenous in their conditions can be classed together as coming into the same period and capable of the same treatment.

Our present valuation surveys useless for the purpose.

186. It is no use going on taking valuation surveys over the whole of perfectly indefinite areas, drawing great averages for forests, large undetermined portions of which are blanks; and leaving it totally uncertain how the different age-classes are distributed, whether every part has a tolerably equal proportion of ages, or one has more old trees and another is full of saplings, and so forth.

187. Had our valuation survey system commenced with a thorough definition of the natural or locally recognized sub-division of each great forest,—even without any more accurate and less empirical division, and had proceeded to give an analysis of the contents of each separately, the amount of time, physical energy, and money value expended on the valuation surveys recorded in the statements printed in each annual report would have sufficed to have given the most minute knowledge of the selected tracts that could be desired by the most critical taxator.† In the existing plan the Taxator *admits it as a great evil that his plan had to take whole forests without any special inventory of what they contain*, and so he was obliged to group them in a serial order by what is in fact nothing more than the *best guess* he could make.

Defects of the existing plan consequent on the survey results.

	Tons.	
* Average British	44,300	121,600 in round numbers.
Foreign	77,300	

† It is from this point of view that our valuation surveys may be criticized, and not in the way Colonel Fraser and Mr. Leeds objected to them. The linear survey plan adopted requires great care, and a real and genuine interest in the subject, and a professional pride in and desire for, accuracy.

But even then, made as they were over indefinite areas, they could only give a general guide to the total number of trees available for girdling, on the plan of providing a sort of general rotation over the whole teak area *en gros*, and this is really all they were intended for. It is hence no disrespect to whoever invented them (as the then only feasible plan) to say that they were utterly useless for any other purpose. As an inventory of the contents of a forest, such as 'the Myolha,' "the Koon," &c., they are useless also. Without a previous "parcellaire" and sub-division of the forest into definite areas according to growth, &c., so as to get the valuation results of each compartment separately, the system as at present practised simply leads to nothing, or worse, it positively misleads.

This is all very well for five years only; but it cannot go on for ever, and sooner the necessary steps are taken the better.

Survey how to proceed.

188. I assume, then, that the Conservator submits his proposals for certain special reserves, the local name and roughly-estimated extent of which he will give, and that he will estimate the cost of surveying them and state the establishment he requires; he will divide the work and its cost over the number of years in which he will be able to complete it, and no difficulty should then be made about sanctioning an expenditure for which we are sure we shall have a worthy return.

Object of the survey.

189. The survey will have for its object to show on its maps such of the existing natural features of the area as are requisite to guide the subsequent operations.

190. The method of survey and the precise scale will be carefully determined by the officer charged with the work. That officer must work directly under and in constant communication with the officer who has to make the working plan afterwards, so that it may not be found at last that some material facts have been omitted.

The conditions of the case simplify the work to a great extent.

191. The work is extremely simplified by the conditions of the case.

The boundaries of the surveyed reserve are certain to be in all cases known, absolutely undisputed, and perfectly free from intricacies of angulation, which in other more populous countries are caused by the contact of private estates, &c.

No rights have to be determined, no boundary lines of excise or extent of right have to be inserted.

Those who have surveyed the forests in the Dehra Doon and similar parts of India will appreciate the boon conferred by this state of things.

The facts to be ascertained by the survey.

192. The following points will require to be noted (but such a list is not, of course, intended to be exhaustive).

(I.) The formation of the ground, the chains of hills, spurs, and valleys. This will also include the natural and locally-recognized sub-divisions of the forest which have separate names. In the plains, depressions where water may collect, where inundation is to be apprehended, where there are possible obstacles to export roads, &c.

(II.) Streams, lakes, ponds, &c.; also marshes, masses of rock, tracts of laterite.

(III.) Roads should be shown when permanent; indeed, it would be well if the surveyor were to consider the necessities of traffic through the forest, and mark the necessary or proper lines of road, omitting all other vague and meandering tracks.

(IV.) Objects outside but close to the reserve. All these are obvious and easy matters for almost any surveyor; but we have also to ascertain and mark on the map or maps (for there may be several to avoid crowding details on one sheet) the following facts:—

(V.) The features of growth of the forest, *viz.*, changes of *soil*, the limits of the growth of *species*, the limits of the growth *by ages*, and the growth according to *denseness*. Thus, we may have to indicate an area full of padouk, part of it being of all ages and part of quite young saplings; another part where there is teak all old, teak all second class, teak of mixed ages;—and also showing where the growth is dense, where sparse. This requires to be done under the direction of the officer who is to make the working plan, *who determines what differences in this way he wants to record, and what he does not care about.*

Importance of this (V) branch of survey.

193. On this part of the work depends the "parcellation" or forming into compartments, which is the essential foundation of the working plan. The latter part of the work is really less formidable in Burmese forests (such of them as I have seen) than it looks on paper. These forests are perpetually intersected by small streams; these streams and their feeders have generally local names, even the smallest of them: each portion then that is drained by the stream has at once a local name, and is identifiable, and the natural divisions not unfrequently will be of the greatest assistance to the surveyor, as he will often find the varieties of growth, &c., conterminous with the major or minor local sub-divisions, and so form compartments which are natural as well as technical ones. Having got our map with such details, we can arrange, name, and number the compartments.

194. And here I trust a definite uniform nomenclature for working divisions of a forest will be adopted,* as already used in the first working plan of a complete kind printed in the Punjab (Working plan of the Kalatop forest, Lahore, 1873). Just as for administrative purposes, we have the 'division,' 'sub-division,' 'range,' and 'beat,' so we have the working divisions separated into 'working circle,' 'block,' and 'compartment.' The 'working circle' is the group of forest for which one working plan provides. The working plan now in force treats all the forests as one "working circle," each division as a "block," and the local forests as compartments. Or perhaps more correctly, I should say that each division makes "a working circle," the forests are the "blocks," and there is no division into compartments at all. I would so far retain the system as to make the 'working circle' coincide with the forest administrative 'division'; and coincidence of administrative divisions with working ones, as a 'block' with a "range,"—one or more complete 'compartments' with a 'beat,' is always an advantage, and should be aimed at in all cases, but cannot always be carried out.

Nomenclature of *working divisions* to be adopted.

The administrative division should coincide, if possible, with the working division.

195. The "block" is a mere aggregate of 'compartments,' generally dependent on situation.

For instance, suppose the working circle contains several special reserves in different parts, each may constitute a 'block' of the 'working circle,' or one special reserve may be divided naturally into two or more blocks.

The 'block.'

196. 'The compartment' is the smallest or lowest working division, and that of the greatest importance. They must to a very great extent depend on the condition of growth, &c., observed on the ground;—the Taxator making such dispositions modifying the *primâ facie* grouping suggested by nature, as his judgment leads him to. No one, without seeing the forest, can lay down an *a priori* rule as to size. They should neither be large and unwieldy nor too small. If there are soil differences occurring within a small area which is conveniently formed into one compartment, the difference is indicated thus—

The 'compartment.'

	Acres.		Acres.	
Compartment X	60	(*a*)	30·5	Young teak thicket.
		(*b*)	29·5	Blank.

197. An area statement has now to be drawn up. In the *Kalatop* working plan, which is published, an excellent form is used (page 20 *et seq.*); and the details being there filled up, a good exemplar is afforded. The area is divided into (1) area which produces wood; (2) other forest land, *viz.*, that occupied by forest houses, gardens, cultivations for local laborers, &c.; (3) not wood-producing area, *i. e.*, tracts of rock, roads, &c.

Area statement.

198. The relative goodness of the soil should be stated for each compartment. This is conveniently indicated by numerals, thus—

Relative goodness of soil.

Exceedingly good	0·9
Very good	0·8
Good	0·7
Middling good	0·6
Middling	0·5
Middling bad	0·4
Bad	0·3
Very bad	0·2
Exceedingly bad	0·1

199. The column "proposals" are the notes made while looking carefully over the forest on the spot, as giving the Taxator's first impressions or ideas as to how the different compartments will fall into the different *periods* of his scheme. They need not necessarily be adhered to in the plan itself, as other matters may afterwards tend to modify the views *primâ facie* entertained.

First idea of working entered on the area statement.

200. The valuation of the growing stock in each compartment may be done by the old linear method, or by the method which is clearly described in the first paper of the "Punjab Forest Conference, 1872;" that is a matter for local determination.

Valuation survey.

201. I would include in the valuation survey teak and the "valuable kinds," such as those specified in the forest rules, not others, for we shall see presently that they are destined to be got rid of.

What kinds of trees the valuation survey should notice.

* It may be thought almost a trifling matter to notice, but it is not so. Any one who has tried to work a forest systematically knows how necessary it is to have a recognized sub-division known by terms the meaning of which is invariable.

"Rotation" need not be determined in the present plan, but the length of 'revolution' or period in which the conversion is to be accomplished.

202. Reverting once more to the ideal or principle on which we are to work, that of conversion of the forest and constituting a capital capable of being regularly worked, we have no occasion to determine a *rotation* for a forest which is not yet in existence, but we have to determine a *revolution* or term of years in which we may expect to accomplish the conversion.

Length of revolution.

We may assume that it takes 150 or 160 years for a teak tree to reach first class size (of 6 feet and over); and although it will not take so long as that for a period of revolution, still the period will be a long one. Even the richest forest tracts taken in hand for conversion will have a large proportion of what are to all intents and purposes blanks, and at the end of the revolution we shall have by no means an equal distribution of all the age-classes. However, in the case of a slowly-maturing and not rapidly-deteriorating tree like teak, this will not much matter. Some of this surplus area of one age, though ready for exploitation, must stand over a few years, and there will then be the constituted material for a regular rotation, *viz.*, an area clothed, in suitable proportions of each, with age classes from 1—160 years.

Large proportion of blanks which will have to be artificially cultivated, and give us a large area of young age classes uniform.

Will not much matter, as teak, &c., will bear standing without deterioration.

203. The length of *revolution*, be it 100 years or whatever is determined, will be divided into equal periods, and the compartments grouped as to the order of operations which each group will require in each period of the revolution.

Periods of the revolution.

Yield of material.

204. Before proceeding to speak about these operations, I will notice that *I do not propose, at any rate during the first period, to make the 'special reserves' yield any defined supply for the market.* How I shall supply the market during that time I shall explain presently. It may happen that a quantity of mature timber has to be extracted from the special reserves, either because it is positively deteriorating or because the treatment of the forest demands its more or less immediate removal. Where that is the case, the extraction will be effected, and the material will simply be a surplus over and above the regular supply otherwise provided for. Other material it might be *permissible* to remove; but as teak (which will be *one* of our chief products) does not readily deteriorate, and keeps on slowly growing for a very long period after it has reached first class size, it will do no harm to let it stand; and we want our whole strength in the special reserves devoted for some years to come, *not* to extracting material, but to conversion and restoration.

205. The special working plan for those reserves will not be made in a moment. The final selection and survey has to be effected, and of course the time taken up in these preliminaries is excluded from the period of revolution.

Operations to be undertaken.

206. The precise details of the work spoken of in paragraphs 172, &c., to be undertaken in each special reserve it is impossible to enter into in a report like this.

But it is clear that they will consist (1) in artificial cultivation, which will be perhaps the largest part of the work; (2) in works to assist the natural reproduction of such existing teak or other valuable wooded compartments as are judged possible to treat in this manner; (3) thinning of valuable forest coming on; and (4) removing deteriorating material, &c. (paragraph 204.) A few remarks as to each may be made.

Plantation, *i. e.*, artificial reproduction works.

207. In the first place, as regards the existing plantations, the small ones, which are now distinguished as "experimental", must be left out of calculation; they may either be left to themselves, or, when worth it, as at Myodwin, given over as district groves. The big ones will all come *into* a special reserve, and form one or more compartments of that reserve which will be already stocked when the working plan begins. Kyêtpyoogân is the only one which is an out-lyer. I do not offer an opinion as to whether it will best be given up as a district reserve or kept as a sort of outlying compartment, or rather set of compartments, attached to the nearest block; but further expenditure in increasing its area I deprecate entirely.

Use of plantations already finished.

Kyépyoogân.

Future artificial reproduction.

208. Artificial cultivation will be possible all over special reserves except on limited blanks or impossible areas, because the general suitability of the soil for forest culture is a *sine qua non* in the selection of such reserves.

Species to be cultivated.

But soil that is good for one species is not so good or not good at all for another; teak of course has too known and established a value not to make its continued cultivation on the large scale desirable, but teak should never be forced on unwilling localities, if I may be allowed the phrase.

209. Teak will require the utmost care; hitherto it has been grown alone. I myself suggest that it will be much better to grow it with some other tree as a nurse, and I decline to believe that teak properly planted suppresses under all circumstances every other of the whole list of available species. Teak grown pure.

Teak is a bad forester; it does not improve the soil, and its leaves do not readily form *humus*. Reasons against pure teak forest.

If it is grown pure, it must be grown *close* together. Mr. Schlich urges on me that it should not be planted further than 4 *feet apart each way*. I quite agree with him; the greater cost at first is trifling compared with the after expense in weeding and clearing, which is saved. If pure, must be close planted at first.

210. Another plan is to prescribe the cultivation of some staple, such as cotton, sweet potato, &c., between the lines; in this case, the sort of plants should be determined and laid down in the directions issued. It is of course desirable to get an income from produce if you can; oil seeds would pay best, only "till" (sesamum) exhausts the soil. Mustard and rape should be tried. Growth of teak with herbaceous crops.

211. The direction department should carefully instruct about weeding, or else useless expenditure will be incurred. The best plan undoubtedly is to clear thoroughly in lines 2 feet on either side of the young plants, thus giving a total cleared width of 4 feet—clearing from north to south. Mr. Strettell's (Deputy Conservator's) remarks in his Magayee report are quite true. Weeding.

After describing the impossibility of clearing the *whole* of the vegetation, he adverts to the other extreme plan of merely weeding just round the plants. "The plan (of weeding round the trees only) though apparently more economical than the 'lines system,' is the reverse; for, in the first place, it is very questionable whether any overseer would take the trouble to wade through the heavy long grass and weeds intervening between the clearings to see that each tree had been properly attended to, while again this mode of weeding would result in the 'panning' of the trees, *i. e.*, forming a basin or receptacle for the lodgment of water round the stem which kills the tree. The lining system obviates all this and facilitates inspection by enabling the plantation officer to run his eye down each path, when a more careful inspection does not seem called for."

212. Returning once more to the subject of growing teak with "nurses" or in a mixed forest, I would urge the Conservator to set on foot at once areas treated with teak and another species adopting close planting. Mr. Schlich's distance of 4 feet is the best. To secure the 'nurses' I would put out nursery plants, *sowing* the teak as usual in the places between. Where the nurse or mixture species is a very slow-grower, I would give it a whole year's start over the teak sowing, *e. g.*, in the case of "pyingado" (*Xylia dolabriformis*). The species I would try are:—

Gyo (*Schleichera*) and teak.
Padouk (*Pterocarpus*) and teak.
Pyingado (*Xylia*) and teak.
Yemanay (*Careya*) and teak.

I think Mr. Ferrars mentioned Thabyú as a good nurse.

I would arrange the plants so that the species should come not in clear lines either way, of each sort alternately, but a plant of one opposite and next to, a plant of the other, and so on. Thus:—

Line 1. Gyo, teak, gyo, &c.
„ 2. Teak, gyo, teak, &c.

I would not try *unlikely* trees with teak. Sappan wood is a shrubby species; it may do to cover the ground, but is no use as a nurse; indeed, I doubt if the great leaves of the teak will not choke it.

213. It should be determined whether to sow teak *in situ* or use transplants. The balance of experience is in favor of the former, but we must have also nurseries, so as instantly to fill up blanks by little transplants, which is safer than re-sowing blanks. Question as to whether teak should be sown or planted.

214. One word on repairs; let it be a rule that an area is *not* to be sown over and over again, season after season. The plantation officer may do what he pleases as regards repairs and re-sowing *in the year;* but he must get sanction before he re-sows an area one year, which was a failure of the year before. Whether that sanction is given depends on the supervising officer being satis- Repairs; rule to be observed.

fied that the failure is due to accidental causes and is not likely to occur again, or whether it proceeds from unsuitability of soil.

Seed stores.

215. Organized depôts for good healthy seed will now become necessities in each forest division; not only for teak, but other valuable kinds.*

Pruning teak.

216. I take occasion here to note that it seems best not to *prune* young teak with a knife; pinching off shoots with the nail does no harm. I do *not* include as pruning the cutting back of weak tall saplings, or cutting away shoots from the root; that is quite a different matter.

Teak in Toungya clearings.

217. Encourage the toungya system of teak cultivation as much as possible; the results we saw in the Tharrawaddy were all that could be desired. But supervision is necessary: in Prome the officer had been taken in by the people having planted up a little bit of the clearing and shown him that, trusting that he could not penetrate further, and he did not.

The trees are planted very close, which is desirable; they are kept weeded for two or three seasons and then handed over to the department, which gives a reward for so much per acre successfully treated.

But care must be taken to form these toungyas in a serial and systematic manner, and not have them scattered about here and there; the compartments suitable for this treatment should be prescribed in the working plan.

Flowering of the bamboo in teak tracts.

218. Another plan which may be spoken of as artificial cultivation deserves notice, and that is, to avail ourselves of the flowering, seeding, and subsequent death of bamboos, especially those kinds which affect good soil. The seed is collected and the dead stems are burnt. The ashes are lightly worked into the soil, in which, thus loosened, the bamboo seed is sown with *teak*. The growth of the bamboo is slow in its first years, and serves to draw up the teak without giving that cover over-head, which is pernicious. Afterwards no doubt the bamboo has to be cut away. We saw in the Tharrawaddy a fine growth of teak actually out of the midst of bamboo thickets and drawn up by them.

Bamboos in forest; their effect.

219. Bamboos are not always good however. Mr. Ferrars, speaking of the Koon forest (Sittang), thinks that they are bad. He advocates cutting the full-grown bamboos before the teak growing in the midst of them is killed. This is perfectly true; the seed cannot germinate, or at any rate cannot grow up, under luxuriant clumps of full-grown bamboos; but that does not militate against the undoubted success of trees which grow up *with* bamboo, as the slow growth of the latter in its first years is a remarkable feature. In fact, it all depends on the start the teak gets. In places where we see teak doing well with bamboo, I have no doubt that the teak got a good start before the bamboo reached that age when its growth is rapid; and, indeed, when once this age is reached, *cutting down* bamboos without total *eradication* of them would be useless. Mr. Schlich informs me that in the Choungwah plantation in 1869, the ground was completely cleared (by cutting) of bamboo before planting out the teak; but the bamboo came up again so densely and so rapidly (they grew to a height of 15 feet in less than three months) that it was almost impossible to save the teak plants. "At the end of the season," he says, "they looked like thin strings."

Cutting down bamboos without total eradication is useless.

The plan before alluded to of sowing teak or sowing bamboo in plantations is always dependent on letting the teak get a start, and in the latter case the bamboo seed should not be put in till the second season.

Other species to be grown.

220. I here also recommend growing the India rubber, padouk, thingan, *Lagerstræmia*, and other species. India rubber should only be grown in moist, shady forest. Mahogany growing should be assiduously pursued. On the Attaran, I am confident it would be a great success. Several trees are now growing well, even on poor soil, at Maulmain.

Plantation Note-books.

221. Note-books must be kept up so as to record the experience gained in each tract under treatment. These books are to be official; private notes disappear with the officers to whom they belong. The entries are to be as brief as consistent with full record. Copies of a circular which I issued on this subject when Conservator of the Punjab are in the Forest office at Rangoon.

Assisting natural reproduction.

222. As regards (2 and 3) natural reproduction, and assisting existing good forest, it consists, besides clearing creepers and parasite *Ficus* (a work

* On the subject of seed, will the Conservator start some good experiments to test the fertility of teak seed? Trees seed when very young; does the seed germinate as well and produce such healthy plants as that from older trees? What is the best age for yielding seed? Do old and dying trees yielding seed produce bad and feeble plants?

which can be assiduously prosecuted on definite areas yearly, now that the work is limited), in gradually rooting out bamboos and cutting trees of worthless species so as to aid the domination of teak and valuable trees.

This last has to be done with caution and *gradually*. The effect of the cutting (or simply girdling, which is often sufficient) has to be watched, as we have to avoid sudden exposure of the soil to too much light and air.

This work will be accompanied by loosening the soil and dibbling in seed (*vide* rule 54 of the new Code).

223. Then as to the removal of mature timber (4). This will often be *necessary* from a forest point of view; it will have to be done *not* for the regular market supply, but solely for improvement of the forest. There will be deteriorating material to be taken out. Portions of the forest are in such a state that "preparatory fellings" or other fellings in the natural reproduction series require to be made at once. Other places have timber where the definitive cutting (*coupe definitive*) in the series has to be made, and so on. The working plan will have to describe all this.

The extraction of material in these cases *must* be done by Government, and under no conditions whatever by permit-holders.

Retention of soil by leaving the cuttings on the ground.

224. Mr. Ferrars advocates leaving the felled trees (of worthless species) on the ground (of course unless use can be made of them). He thinks the risk of insects is not so great (to teak especially) as the advantage of holding the soil together on slopes, &c., by the effect of the recumbent logs, which will be generally of small girth.

Present condition is one of rapid deterioration.

The rapid deterioration of soil is *the* most noticeable feature in existing teak forests, partly because teak leaves are not *so* good for formation of humus even when they escape fires, and partly because of the exposure during the hot months, when the teak forest is bare and leafless, and has little undergrowth.

All these works to be carried out by system on definite areas.

225. These and other works for *each compartment*, according to the nature and requirements of it, have to be laid down in the working plan. Most of the cultivation will come in the first period. The work should be *generally* indicated for the whole period, *fully* for the first ten years of that period, and *minutely* for the first five.

Settlers for forest labor.

226. The great difficulty in all planting operations and works of regeneration is labor. Every effort must be made to encourage settlers, Shans and others, but I recommend seriously to consider the importation of labor from Chota Nagpore. I learn that the Rangoon Municipality are at the present moment importing some labor from this place, the preliminary cost being only Rs. 17-8 per head. The men get as pay afterwards Rs. 7 per mensem and their food. I see no reason why we should not import labor like this for plantation purposes. Labor we *must have*, and the sooner vigorous and determined efforts to get it are seriously made the better.

Importation of labor.

Question of the supply of the market during the progress of the constitution of material in the special reserve.

227. One other point has to be noticed; our main strength of establishment has to be concentrated on the varied and important works in the special reserves, which, being prescribed in the working plan, admit of no delay. How then are we to provide all this time for the timber supply of the market? This subject was indicated at paragraph 204.

Yield must be conducted without a great demand on the strength of establishment.

228. A preliminary observation is, that we must conduct the yield in the manner which gives the least possible work to the Forest staff, in other words, in the manner which will demand the withdrawal of the smallest portion of the establishment strength from the work in the special reserves.

If any system is adopted which demands a minute previous examination of the forest, and season after season spent in girdling on the present system, I do not see how without nearly doubling the staff we can possibly take up the real forest work otherwise than in a desultory manner, and thus perpetuate the reproach that while timber is sold nothing is done for the forests.

Supply market. Working plan for ordinary revision.

229. The way in which I propose to supply the market is explained by the working plan for the "ordinary reserves." I premise that I do not suppose that *all* the teak localities will be brought into such reserve, but that the department must be at liberty to have the teak first out of any tract that has teak in it, but is not convenient to reserve.

This working plan will be of a general nature; more at present we cannot, I fear, attempt. It will comprise—

1.—A division of the "ordinary reserves" (temporarily including other teak localities not reserved, simply for the purpose of

extraction of remaining material) into blocks and compartments for working.

2.—The determination of a yield-table for the period of revolution (say 100 years). The table will not fix the yield beyond a few years at a time; whether it is necessary to have so frequent a revision of it *under the new conditions of the case* as every five years, I doubt.

3.—Prescribing general preservative and preventive measures, calculated to maintain the forest *as an organic whole, in that state in which a forest is of the greatest climatic or indirect utility.*

Division of the eastern forests for yield purposes.

230. In the first place (as regards No. 1), I propose, after excluding all the special reserves, to divide the whole of the ordinary reserves (and other teak localities as may be necessary) in the eastern forests of the five divisions into 10 blocks for each division, and subdivide each block into 10 compartments, thus definitely adopting the plan merely indicated in paragraph 33 of the plan of 1868.

One compartment in each division, or five compartments in all, will be open each year, and thus there will be five compartments for each of the 100 years.

After some years have elapsed and the progress of the special reserves under their detailed working plan shall have been pronounced secure, we *may* find it permissible or advisable to increase the number of compartments to be worked, and curtail the length of the period.

Each compartment will be open to a clear felling of *all trees of six feet girth and over* (first class trees).

Whether this felling should be done by permit or by Government direct, I shall discuss hereafter.

Size of the compartments and order of working.

231. The compartments will be arranged easily by the aid of the *data* we already possess in the valuation survey records; they will be calculated, not according to area, but according to the estimated *number* of first class *trees* so as to secure a nearly equal quantity of material in each. The order of working will not under the special circumstances be very important; but of course outlying teak localities *that we want to give up*, will be cleared out first, and the other compartments will fall into order according to local circumstances.

Reasons for this treatment.

232. There will be no sort of risk in taking out all the marketable trees. Mr. Schlich, an experienced and trained officer, thought the plan safe in 1868, even when the plan contemplated the permanent maintenance *as teak-yielding localities* of the whole of the forest. How much more then is it safe and rational, when the reproduction of teak *as a species* in the ordinary reserves becomes of secondary importance, and in the outlying forests of no importance at all.

Our teak reproduction will be secured in the compact special reserves, and we do not care whether it is reproduced over the whole of the other forest.

Moreover, this is the only plan which is not only perfectly safe, but at the same time insures the required facility in working, and obviates the employment of a large staff in *selecting* trees to be felled.

Check on the fellings.

233. The felling being done in perfectly definite compartments, the one and only check needed will be at the revenue station, to see that small timber below a fixed girth is not passed, and if such timber is brought down, the responsibility is thrown entirely on the contractor of Government or the permit-holder, as the case may be, to *prove* that the small pieces are either top-pieces or lawful trees felled high up owing to a flaw in the lower part. To secure such proof is quite easy, and the workmen must make the necessary arrangements or else lose their timber. Knowing this, they would not attempt to cut undersized trees.*

234. As regards the measures for preservation; the compartment division will have to be supplemented by a system of fire-tracing; and practically, a thorough exclusion of 'toungya' cutting and of fires is all that is wanted to preserve the forest (ordinary reserve) in a state of efficiency.

235. Frequent tours of foresters and their attendant guards, and occasional and unannounced visits of controlling officers, would do all the rest.

Plan for the western forests.

236. For the western forests a somewhat different system may be necessary. Hitherto, they have been leased out for a term of years, the lease

* Even if they did the damage would not be so serious, as we have no great anxiety about the reproduction of teak.

including the right to fell or girdle, as the lessee chose, all trees of 5′ girth and over. All the leases expire at the close of the present year 1873.

We have already arranged for the reservation, as an ordinary reserve, of a block in the Thayetmyo district, and the same can easily be done in the rest of the districts. The area to be kept out of the general area as special reserve will be selected and demarcated, and these special reserves will be surveyed and treated under the special working plans just like any other special reserve. For the *rest* I would propose to extend the leases (limiting the area where necessary owing to the exclusion of the special reserves), for another two years: by this time the available stock remaining in the ordinary reserves will be known, and then they can be divided into compartments for clear cutting of teak as in the eastern ordinary reserves.

237. It will be well, after the length these remarks have unavoidably extended to, briefly to recapitulate the proposals for the working plans.

A.—Working Plan in detail for Special Reserves.

Recapitulation.

1. To select the special reserves everywhere, both east and west, survey them, draw up the area statement, and arrange the compartments in order to making a working plan which is to effect the conversion of these tracts into a regular high forest of successive age-classes, in a given revolution, the revolution being divided into periods, and the work fixed for each.

(2.) To aid this work by *excluding* all timber-yielding operations, at least during the first period, from these reserves, having only such extraction of material by Government agency only as is necessary on forestal considerations.

(3.) To prescribe for each compartment in the working plan its own treatment, where planting is to be done artificially, and what stock is to be planted, where thinnings and works for aiding natural restoration, &c., are to be done, so that everything may be done systematically.

(4.) To take the fuel reserves and "kuch" reserves separately, they being worked by the coppice method of clear cutting by area, while standard trees are left so many to the acre. (*Vide* Appendix A.)

I have to add that I propose a separate and special plan as simple as may be, to deal with fuel reserves and cutch plantations, both of which are treated on the coppice principle, and perhaps the coppice with reserved standards.

B.—Working Plan for Ordinary Reserves.

(1.) The yield of teak to supply the market during the progress of the work under special reserves is to come from the existing scattered teak tracts, *exclusive*, of course, of the 'special reserves,' and temporarily *inclusive* of teak tracts not intended to be reserved at all.

(2.) To group all such tracts in each of the five eastern divisions into 10 blocks, and each block to be subdivided into 10 compartments, and open one in each division simultaneously, every year to a clear felling of *all* first class teak trees they contain, taking the outlying tracts first so as to release them when done with.*

(3.) To provide general protective measures of fire-tracing, toungya prohibition, &c.

(4.) To deal separately with the western forests other than specially reserved portions (paragraph 236)

Preparation of the annual report.

238. And lastly, a word may be said on the Annual Report, the "*compte rendu*," to the Government of the forest progress. This must be so prepared as to enable the Government to see definitely *what has been done in the year out of the work allotted in the working plan.* As soon as the plan is ready, a review should be taken of the *status quo* from which the plan will start, and thenceforward our reports may be about one-fifth their present length, and all uniform, *i. e.*, taking up the same subjects where the last report left them. At present for any Government to review or pass orders on a forest report is most embarrassing. A brief summary of what has been done is made; is it satisfactory? how is Government to know whether it is or not? Usually we plunge into the tabular statements and extract real or supposed financial results. But a casual surplus of revenue due to accidental

* On second thoughts, I am inclined to suggest that all trees might be cut as low in girth as *five* feet.

causes is compatible with the *utmost* rottenness of administration, while a deficit may accompany the most truly based economy. There is no definite line of action to be pursued, no definite goal to be reached; hence it is impossible to perceive whether the steps taken by the department are wise or unwise, progressive or retrograde. Complaints then arise that 'nobody knows what the forest officers are doing.'

Advantages offered.

239. In future, if the work is limited and laid down as I propose, every year's brief record of the progress can be at once compared with the standard which the plan lays down for each group of forest area. The material for review and for orders by the Government then becomes obvious; authority can be brought to bear on removing administrative obstacles, censuring where the allotted works have causelessly failed, strengthening the working power where it is weak, setting it right should it have misinterpreted the directions laid down, and knowing clearly the why and the wherefore if that work has not been done which the plan says ought to have been. Comparisons of expenditure and revenue will then also be made upon an intelligible basis, and with results that lead to true economy and efficiency.

ADDENDUM TO SECOND SECTION.

"On Teak Girdling."

THIS is really no question of forest management, and so I keep it separate; yet it has an important bearing on the execution of forest work. Whether in itself girdling is a good thing, that is, whether timber girdled and left to stand dead for two or three years is really better, more elastic, less breakable than teak which has been felled green and then seasoned afterwards, it is difficult to determine.*

Of the vast mass of opinions collected, many weighty ones may be found on either side. Only one fact is *known*, having been determined by analysis: there is no difference as regards the wood-oil of the heart-wood in teak felled green and in girdled teak. Teak will not float till it is somewhat dry, so that two courses are open, one to kill the tree and let it stand *in situ* till it is dry and floatable, the other to fell it alive, rip off the bark, drag the logs to the nearest open spot where there is a slope, so that the sap may drain off, and have free access to the sun and air; it is even propped up and scorched by small fires applied below. As soon as the log will float, it is put into the water, when it floats heavily and with but little of the bulk above the water surface; it may even require to be lashed to bamboo supports. It is not safe to leave it long lying in the forest, for in spite of the precautions taken to clear inflammable matter away from the spot, accidents may happen during the season of forest fires, and much damage result. Girdling thus became a common practice in Burma, the more so as the logs when cut are much easier dragged than green ones.

With the Forest Department the system was maintained, because it obviated the difficulty of the logs lying to dry exposed to forest fires, &c., and because, as the system of forest working was "jardinage" or "selection-felling," the girdling of trees was an efficient means of indicating the trees which were to be taken out, and also proved the best check on the unlawful cutting of other trees that could be devised. The department insisted on the trees standing such a time that their condition would at once distinguish them from trees cut green or cut after a shorter period of girdling. Moreover, the dead tree standing in the thick forest could be readily seen at a distance, and this was a great boon in forests where the teak is scattered one here and one there, and the crown and leaves of the trees often hidden in the general canopy of the foliage overhead.

The period we (very unwisely, as far as the mere *check* is concerned) reduced from three years to two years, *i. e.*, from a period in which the condition and appearance is certain and can be recognized even by unskilled people, to one when, though clear enough to skilled persons, is not totally free at any rate from an appearance of doubt, as will be known by any one who has heard the cross-examination of a witness in a forest case, who asserts that such and such a tree was not two years old.

If girdling is retained, the three years' period must be reverted to.

But if my proposal about the 10th part, *i. e.*, of one block in each division of the forest (*not* being special reserve) is adhered to, it will be simply a waste of time and money to girdle the trees. I would let people bring them out, girdling or not as they please.†

But when we come round to a time when either clear cutting is done for artificial reproduction, and still more when serial cuttings are made for natural reproduction, and this is nearer in prospect, girdling will present a great difficulty.

Suppose we have an area of 10 acres clear-cutting, we want the place clear and to commence preparing the soil for re-cultivation; if trees are to stand two or three whole years seasoning on it, all this time will be lost.

Supposing, again, in a compartment treated for natural reproduction, I wish to make my 'preparatory cutting'—as far as light is concerned, the girdling is as good as felling almost, though not at all the same for air circulation and affection of the soil; but when I begin to take out the material, the young seedling crop will be trampled and injured; still more harm will be done at the "secondary-cuttings." Girdling, I think, *must* be given up sooner or later.

This is the only real conclusion we can come to on the subject, for timber dealers' opinions vary, and will vary for ever, until we come to be civilized enough to recognize that girdling and seasoning on the ground are both barbarous methods of seasoning timber under any

* The determination is not assisted by mere assertions nor by calling the system by hard names. Mr. Theobald's otherwise valuable paper on forest matters which struck him in the course of his geological tours (Burma Proceedings for March 1873) is much disfigured by this. The postcript to that paper is incorrect, for Mr. Theobald obtained a wrong set of experiments altogether. Those he had the record of were made *without the smallest* reference to the question girdled teak *versus* other teak; they were simply conducted at the request of Messrs. the Burma Co., to test whether there was any real difference in average quality between the timber that was offered for sale in the Rangoon market and that in the Maulmain market. Particulars, therefore, as to when the wood was felled were for the purpose on hand of no value; it was simply to test so many samples taken at random from one market against a similar set from the other market. In a few cases, indeed, particulars of the timber which happened to be known were noted in the remark column, and thus gave rise to the misapprehension. Mr. Theobald's desired conclusion can only be attained by arbitrarily excluding some of the logs from the calculation.

† And perhaps this will best solve the question *pro* or *con*. The interest of timber-dealers one would suppose, and the instructions sent them by their habitual consignees from home markets, would soon determine them whether they would girdle or not.

circumstances, and that artificial expulsion of the fermenting and detrimental fluids with or without induction of preservative solutions in their place is the only truly economical and rational method of timber treatment. A considerable proportion of the Maulmain timber is not girdled; some of it is girdled by the "Natchoung douk" system, *viz.*, cutting deeply into the tree, and then making an augur hole right through it, in fact leaving it standing on just "two supports." This has the same effect as girdling, only in a much shorter time. It enables the tree to consume a quantity of sap in the death-struggle in the endeavour of the tree to go on growing after the circulation is interrupted by the girdle; but further, by exposing a larger surface of severed wood, it causes the sap to flow off, and drying to set in much more rapidly. After a short time, *i. e.*, after a very partial drying, the tree is felled, barked, and exposed for some time, and it will then *just* float.

If girdling is abandoned, the logs will have to be placed in some position safe against fire; stacked in a form favorable for drying without the logs being too much in contact, and there must be kept till they will float; unless, indeed, they can be attached to half-hollowed boat hulls. Depôts for seasoning will have to be formed, as the wood should not be sold green for fear of injuring the market.

'Maulmain teak,' as such, is not really superior to any other teak, only that Maulmain being the teak market long before Rangoon was or long before it was generally known as one, 'Maulmain teak' got to be a stock phrase, just like 'Carolina rice,' 'Lyons silk,' or 'Bordeaux plums.'

SECTION III.

OF FOREST ESTABLISHMENTS AND OF SYSTEMATIZING THEIR DUTIES.

Object of this section.

240. I do not propose in this section to indicate a scale of establishment which will do for British Bûrma, because it is impossible to know exactly the number of men we want till the list of ordinary and special reserves is made out, but I can indicate the principles upon which such a scale should be constructed.

Principles on which a proper establishment scale is to be constructed. The scale must be either agreed to, or the responsibility of diminishing the area of work accepted.

241. If those principles are adhered to, I feel sure the Financial Department will agree, because the schedule will prove itself; it will not merely ask in a tabular form for so many Assistants, so many foresters, &c., but will show the work to be done and the approximate area of duty which is assigned to each man, so that no one *will be able on merely arithmetical considerations* to cut down the list. The reduction will carry with it the definite abandonment of a sphere of work *pro tanto*. On the other hand, the means of judging of the merits of the proposals on a full understanding of the wants of the forests will exist.

Official titles of officers, of what importance.

242. As to the official designations of the officers I shall speak further when dealing with the forest rules. This is not the unimportant matter it might at first sight appear; it is one step towards system and to the attainment of the principle which I desire to state here once for all as the one which ought to underlie the whole constitution of the forest service. It is—

Principle to be adopted with regard to every forest officer on the establishment.

Definite individual responsibility in a definite sphere, with a known object, and under a system of supervision and control, calculated to insure that the responsibility is accepted intelligently and the work done in view of its object.

243. The nomenclature in the rules enforces this.

Duties of each class of officers.

(1) The Deputy Conservator henceforth has a whole "division;" (2) an Assistant Conservator has a "sub-division;" (3) a forest ranger has a "range," or circle; (4) a forester has a "beat;" and (5) the forest guard has to act as the forester's "shadow" and to belong to him; this being necessitated by the condition of the forests, which is such that a man cannot go alone about a beat; they always go two together.*

Present practice as regards foresters (Goungwais).

At present this latter is effected in an irregular and unsatisfactory sort of way by allowing the forester a few extra rupees a month on which he is to support some relative or hanger-on who goes about with him. This man is not exactly a Government servant, nor is his duty or responsibility certain. But the "forest guard's" duty is not uncertain under my proposal: he has his own beat, though conterminous with a forester's, and his duty is defined by a rule which will have the force of law.

The above stated duties are the *forest* duties, the *primâ facie* employment of the officer, but of course many men will have duties connected with the river work also.

Gradation of pay.

244. In proposing the *gradation* scale, I should explain that the object of having many grades is to *make the most of* the power of promotion, especially in the lower offices. The number of gradations does not create any confusion, because the official name is not altered, nor the sphere of work; the grades merely provide for that progressive increase of pay little by little, which is unquestionably the best method of encouraging good men to stay on; it is better to have small rises of pay at shorter intervals, than great rises at distant intervals; until, at least, we begin to come up to the higher grades, when the duties are heavier; then it ceases to be a boon to increase the pay by Rs. 5 or such-like small sums. This, however, is obvious.

Small rises of pay at frequent intervals recommended in the lower grades.

245. The gradation is as follows—

Proposed gradation list.

(Deputy, and Assistant and Sub-Assistant Conservators are already graded by orders of the Government of India):—

Forest Rangers (*Taw-ôk*), 3 *grades*—

	Rs.	
1st grade	200	per mensem.
2nd „	150	„
3rd „	100	„

* Partly necessitated by dacoits in some frontier places, but chiefly by wild beasts. Whatever it is, the Goungwai *will not* go into the forest by himself.

Foresters (*Goungwai*), 6 *grades*—

				Rs.	
1st grade	...	...	...	50	per mensem.
2nd „	...	...	...	45	„
3rd „	...	...	...	40	„
4th „	...	...	...	35	„
5th „	...	...	...	30	„
6th „	...	...	...	25	„

Forest Guards (*Taw-soung*), 3 *grades*—

1st grade	...	...	...	20	per mensem.
2nd „	...	...	...	18	„
3rd „	...	...	...	15	„

Minimum rate of pay: grave objection to the present scale.

246. Lower than Rs. 15 I would not go; and I regard it as the most objectionable feature of the existing scale that it provides for some men a rate of pay *below that of ordinary cooly labour*. This is simply intolerable. It is unreasonable to expect a man to keep watch over the interests of a forest beat and work cheerfully, at less wages than the coolies who are digging up clods in the plantation.

This point was noticed by Mr. Schlich in his Arracan report (paragraph 28), and his remarks are just.*

Much better have less men on higher pay or abandon some of the area till we have got a manageable tract, but let us avoid employing a class of men who cannot be efficient or cannot be honest, possibly both.

Periods of rise in grade, &c.

247. I would propose to give the additional grades in the case of guards and foresters at fixed intervals of three years, subject, of course, to the efficiency and merit of service.

248. I believe orders are already in force regarding the maintenance of *books* in which the dates and particulars of service, leave and promotion, are entered in the case of subordinate officials; these are very necessary both for purposes of control and for after questions of pension or gratuity.

The controlling staff. Effect of transfers.

249. I have now to offer some remarks on the controlling staff. One point has to be noticed first: the effect of the recent frequent transfers to and from Burma has had the worst possible effect, and must be carefully avoided in future. When a man has acquired a knowledge of the language he should be kept, as by that time he will be familiar with the country and the forests, and most persons (especially those who have begun in Burma) after some little time get to like the place very much. Some young trained officers have recently been sent, and these will in time be very useful if *left* here and not taken away the moment they acquire local knowledge enough to be useful.

Officers unfit for the Forest staff.

250. On the other hand there are some officers who might do better elsewhere and who are simply unfit for the hard work: they do not take to it kindly and do not improve their knowledge of forest works at all from year to year.

I must seriously urge a different course of dealing with these men; they should not be kept in suspense, or on the unknown note books of the heads of their departments. They should be clearly told how they are estimated by Government, and that while admitting that they can do such and such work, the Government will *not* advance them to positions where other and higher qualifications are requisite; in short, they may be told that Government considers their services worth so much a month and is disinclined to give them more, except in the case of additional pay (not additional responsibility) for long service. The necessary works in blasting, clearing streams, superintending catchu-boiling, or at ordinary depôts, or even in the mechanical parts of the survey, will give occupation to some of the men we have now. For the important works of the forests, however, we must have a supply of really efficient men, and trained if possible; we simply *cannot do* the work before us with many of the men we have now.

Some of them might be utilised in subsidiary branches of the work.

251. No other province has a claim which can be compared with that of Burma, and I must urge these points very strongly on the attention of the Government of India.

* I have heard that a Deputy Commissioner said he would never convict a forest case on the evidence of a forest guard, because the post is so ill paid as to be only taken by the lowest class of people. A little of this is prejudice, as I doubt that the men are worse than the revenue or police underlings, but there is *some* truth in it.

252. Besides the above considerations, I would urge that whatever officers we have in the upper grades, they must be of such social position and education that they can be on terms of friendly intercourse with the district officers. One of the greatest difficulties to be contended against is the isolation of the Forest staff, as a foreign body—a hostile element in the district. The character and habits of the forest officer sometimes accounts for this, but the Forest officer is not always to blame; sometimes the dislike arises from indifference to, and ignorance of, forest work on the part of the district officer; sometimes to his resenting the possibility of any one else having any position or influence in the district but himself; this I must say is not uncommon. In any case where such a feeling shows itself, it will be overcome by the location of a well educated forest officer, who will at once seek to work in concert with the district officials. He will do everything in his power to facilitate the procuring of timber for district works, and meeting the local requirements of the population; he will constantly consult with the district officer; he will invite him to visit and inspect his works; and then the district officer will perceive that something else is being done besides mere girdling of trees and rafting of timber, and will be led to take an interest in the work.* The people, who always take their cue from the district officer, will also respect the forest officer and obey his orders cheerfully; complaints and disputes will cease entirely. Character and position of controlling officers.

253. I urge here the more frequent employment of natives of the better classes. The Burmese Assistant Conservator we have is one of the most active and useful men in the service. I recommend that all the forest rangers should be natives carefully selected; the knowledge of English is an advantage, but is not necessary to be insisted on. Employment of natives in the forest rangeships, &c.

254. The apportionment of duty already spoken of will present no difficulty. The prominent work must henceforth be the restoration and treatment of the special reserves, and the efficient supervision of the ordinary reserves, and the best officers must be detailed for the work. Apportionment of duty.

The 'divisions' may be constituted as at present, each presided over by a Deputy Conservator, or a really eligible and competent senior Assistant. The only alterations being that the western forests will now form an additional charge, and there is a proposal for a "special works division," of which hereafter; the 'division' will embrace the special and ordinary reserves, and the river beats and timber depôts within its local limits.

255. Then subordinate to the 'division' there must be distinct grouping of the special and ordinary reserves into such convenient sub-divisions as can be efficiently looked after by an Assistant Conservator. These may include one or more timber revenue stations locally within the sub-division; but should the river work and depôt work be heavy, then it ought to be constituted as a separate 'river sub-division' with its own officer. Work in sub-divisions,

It is not necessary that the river sub-division should have its special officer all the year round; it may suffice to have an officer on the work at the busy season, and attached to another charge during the rest of the year.

Very often the Deputy Conservator may himself take direct charge of one of the sub-divisions, besides general supervision over the whole division.

256. Subordinate to the sub-divisions will be constituted the 'ranges' of forest rangers; these should never include both river and forest work, *at the same season*, but river work may constitute a separate range. and "forest ranges."

257. The ranges will be sub-divided into 'beats' of foresters with their attendant guards, and forest rangers will also have two forest guards attached to each. Assistant and Deputy Conservators will not require guards attached, as they will be attended by the officers of each beat while there. The beats *must not* be larger than the forester can efficiently patrol. 'Beats' will never join both river and forest work, but many beats will be river or depôt beats. "Beats."

258. Important depôts like Kado and Rangoon will constitute sub-divisions, embracing the whole river in the divisions and having subordinate "ranges," being the depôts themselves, and "beats" for foresters at the main Beats on rivers and at depôts.

* I do not believe that any system of making forest officers assistants to the Deputy Commissioner would ever work. If the assistant is an untrained man he will have no one to guide him; if he is trained, he will be in the position of a servant who knows better what to do than his master. Moreover, *no systematic improvement ever has been or ever will be attained without laying down the scheme in progressive periods over defined areas by a working plan*, and some one must supervise all the working plans; it could never be done by a Deputy Commissioner burdened with other duties and without any professional knowledge.

and minor stations. On the Salween, a forest ranger can take charge of the river sub-division at Kyodan during the catching season, and this sub-division will require no one specially in charge at other seasons.

Continuous employment at different seasons.

259. I here call attention to the importance of laying down duties in such a way that each *season* should have its special occupation, and that there should be no such thing as an officer sitting down at a station with really nothing to do for several months in the year. Every charge as above defined must be so arranged as to have special reference to *continuous* employment.

"Special works."

260. And now I come to a new feature in the systematic distribution of work—the constitution of a "special works division."

In order not to distract the attention of officers from the pressing work of improving and working up the special reserves and maintaining ordinary reserves and inspecting district plantations, I would place all extraneous works under separate heads, to be called "members of the special works division."

Cutch working.

261. Thus, for convenience' sake, I would place all the cutch tracts, at any rate north of Myanoung, both east and west of the river, under one officer, leaving, however, outlying tracts to the division to which they belong; *e. g.*, the main cutch tracts will be in the districts of Thayetmyo, Prome, and Myanoung. Any little forest, such as that in the Kangyee special reserve, need not be separated.

"Blasting and clearing streams, &c."

262. Again, the important work of blasting and clearing streams and attending to the extraction of jammed timber, &c., should be a separate branch as it is now, only the work should not be paid for by officers maintained season after season under AI. budget head.

In these works the less advanced officers may be employed.

In such a work some of those officers who are not well trained enough for the real forest work may be employed.

Survey work.

263. Then there is the survey work (*vide* paragraphs 109, &c.), as a temporary measure.*

One or two supernumerary hands.

264. Then again, in this division we must have one or two supernumerary officers. There is always employment for officers of this kind. Some one falls sick or goes on leave, and his place at present cannot be filled without sending a new hand, ignorant of the place and language, or causing a great disturbance to other divisions, or causing one place to be neglected for the sake of another. Some one has occasionally to go to Arrakan (unless that is constituted a regular division, as it should be), or to Port Blair, and we shall require a man to look after such duties as developing forest resources in different places, a stock phrase, which, however, I hope here to use with a definite meaning.

Utilizing forests products and making them known.

265. My attention has been called to this subject by Mr. Eden. All that has been done hitherto is to send specimens of wood to museums and exhibitions. This is simply a tithing of mint and cummin and neglecting the weightier matters of the law. On one occasion, indeed, a ship-load of certain woods was sent home, but though the fact was mentioned in one of the annual reports, it was thought, apparently, of so little importance that the result was not worth noting in the next report. I have since learned casually that the experiment failed as the ship was lost at sea. No subsequent attempt of this kind has been made.

266. I have elsewhere spoken of the teak mania; nor was the term unjustifiable; a few years ago no one would have anything to say to the other woods, but this is being rapidly changed now.

Exclusive demand for teak beginning to disappear.

I should like to see some practical man of discretion engaged in bringing out thingán (*Hopea*), thitká, thinwin, and many of the valuable woods of Tenasserim. Then again there is the Kanyen oil and the black varnish—the former could be obtained in almost any quantity from Mergui. Why also should not Government derive benefit from the sappan trade?

Prospects to which attention should be directed.

I am not advocating a premature clearing of a lot of valuable trees, the price of which may hereafter rise enormously, but merely wishing to establish certain products in the market. No attempt to do this has hitherto been made.

Construction of the Prome Railway.

267. I need only turn aside for a moment here to urge the important opportunity in this direction which the construction of the Prome Railway will offer. Mr. Eden has remarked that it will be possible to lay the line without using a single teak sleeper. I trust this enlightened view will be fully

Mr. Eden's view.

* And chinchona planting if it is to be kept up; but I strongly advocate its abandonment by the department. It would be much better done by the district officer with a trained planter under him.

adopted, but I may have to urge the absolute necessity at the same time of attending to the impregnation of the wood used. The needful apparatus would pay itself over and over again in a short time by the economy effected, the more so as in Burma. petroleum, the basis of an excellent impregnation fluid, is abundant. To save wood in this way is an economic duty of Government of the highest order.

But impregnation apparatus essential. Cheapness of it in Burma. Duty of Government.

Nor should the impregnation be merely confined to wood that will not stand without it; the increased longevity of otherwise good woods is hardly less a source of economy.*

Impregnation not to be confined only to poor woods.

268. Also connected with the formation of this special works division, I have to allude to the subject of working out timber for the general market. It is quite undeniable that the reason why we have not progressed more in the improvement of the forests, is that almost the whole time of the officers has been taken up in selecting trees for girdling and checking the girdling. Now if really vigorous effort is to be made in planting up, fire-tracing, improvement, cutting; and all the connected works in the process of *transforming* our irregular and insufficiently stocked special reserves into well-stocked high forest (and that is the object of my proposals), we cannot have the time of our officers taken up with girdling, checking, and supervising the work of extraction at the same time; one work or the other is sure to suffer and to be neglected.

Supply of cheap wood locally.

269. There is, therefore, a decision to be made between the only two courses, either to allow the extraction to go on by the simple permit system alluded to further on, or else to employ, in connection with the special works division, a sufficient number of extra hands, to enable all timber felling and extraction to be *done by Government without* interfering with the work in the special and ordinary reserves. The absolute *dilemma* must be recognized and one course or the other decided on.

270. Whatever duties are assigned to each officer, they will be definite, and will carry with them a definite amount of responsibility, which will enable each man to act in his own sphere without getting special orders on every minute point; and this will prevent the system of passing long official letters on every conceivable point *between a divisional officer and his subordinates*, which I have seen nowhere but in Burma.

Definition of duty and responsibility will enable men to act without an official reference on every point.

271. *Every officer* will keep a diary and keep his superior informed briefly of progress every month, tabulating the information in statement form where *brevity* is secured by this method, and using the narrative form otherwise. In these diaries every observed fact that adds to our stock of forest knowledge should be carefully entered.

Diaries.

This is to be *separate* from the travelling allowance journals. These do contain something of the sort, but they go into the *Account office* and of course are lost sight of in the Direction Department.

Not as at present in "travelling allowance bills."

272. As soon as a sufficient staff is constituted, a list should be drawn up and kept by divisions, showing the names of all divisions, sub-divisions, and ranges, and the names and numbers of the beats (it is convenient always to have the beats with a serial number in each division or sub-division), and the class of officer in charge of each, river beats being numbered with the rest.

Complete list of the staff with every man's beat, &c. &c., to be kept up.

The special works staff of course can only be recorded generally, as its employment will vary, but on such staff no officers lower than forest rangers need be kept, all inferior establishments employed being either "temporary" or under A I.

273. Here I will beg that a clear understanding be maintained as to what is "permanent," "temporary," and "working"—AI establishment. I especially urge the reduction of the practice of taking on people under budget head 'AI.' In this way much money is frittered away, and there may be a really huge establishment kept up, which even the Conservator, much less the Government, can with difficulty check or control.

"Temporary" and "working" establishments.

Guided by such orders as exist on the subject, I understand "permanent" to mean the staff sanctioned by the Government of India; "temporary" to

The difference explained.

* Indirectly connected with this part of my subject is the necessity of making inferior teak pieces and other woods available for the public at *cheap* rates not only at Rangoon, but along the rivers wherever population is aggregated, 2nd class teak, eng, &c., both for house-posts, squared and in plank, would be sold. At Tounghoo, while the forests worked—if such a term can be applied—by permit-holders are full of thousands of cubic feet of rejected logs, top pieces, &c., roof shingles are not to be had at a price. I advocate a system of petty contracts to utilise such material for local supply.

mean establishment employed on certain rates of pay for a limited but fixed time, as for some special work, and *these must be sanctioned by the local Government.* In all cases "establishment under AI" consists merely of daily labour employed in carrying out sanctioned works, or those which constitute the ordinary work of the department in cases where such works are done by employed labor and not by contract; *i. e.*, an establishment of an overseer, writer, &c., kept up for a whole season to blast rocks in streams is "temporary," not "AI" establishment; a gang of coolies employed in clearing and trenching the area of plantation for the season's works is an AI charge.

Office establishments.

274. Lastly, I have to say a word about office establishments. It will be observed as a distinctive feature of the proposals that the *office* hands, clerks and peons, are kept quite distinct from the forest and river establishments, and the terms 'clerk,' 'writer,' 'peon,' are office terms only.

But it is quite essential that this branch of establishment should not be left in the lurch.

Unsatisfactory footing of the Forest clerks.

275. The Forest clerks in Burma are on the most unsatisfactory footing. Yet it is essential we should have good men and keep them.

The account system demands the maintenance of a number of account books, and the periodical submission of various forms. Unless the divisional officers have competent assistance in these branches, they will be tied to their desks, and confined at head-quarters instead of being out in the forests.

276. Yet at present there is absolutely *no definite hope of any rise or promotion to any clerk in the Forest Service*, and the rates of pay are so low, that honest subsistence on them at the price current of labour and provisions in Burma is not possible. While the Department Public Works and civil clerks are graded, fairly paid and cared for, Forest clerks have such a pittance fixed, that either we can only get the cast-off men of other offices, or else, if we do get hold of a steady, sober, useful man, he is constantly on the look out to leave us for better employ.

Proposals for improvement.

277. This is not as it should be. If the Forest clerks are not regarded as a sufficiently large body to have a separate organization, they should be cast in with the general staff of clerks of the Department Public Works or the Department to which the Forest office is attached, and have the same prospects and grades and rises in pay.

Diminution of the amount of writing.

278. I want, however, to keep the number of mere writers as low as possible.

Officers who have to keep copies of many letters, &c., should be furnished with copying presses, such as mercantile houses use.

In the vast works carried out by Messrs. Brassey Wythes and Company in India, they were liberal as regards the number and remuneration of their *working* staff, but had the smallest possible number of mere penmen; all their people used copying presses.

Rest-houses to be everywhere put up for the officers.

279. Lastly, I have to add a word about housing the officers. When it is considered how much exposure the service of the forests entails, there should be abundant means of facilitating the moving about. Rest-houses should be constructed at suitable places as soon as possible. Expenditure incurred in this way is really spent in protecting the health and comfort of the service.

Fixed allowance to the lower grades owing to great expense of living.

280. I should also allow European officers of the lower grades, say below the grade of 2nd class Deputy Conservator, to have a fixed batta or allowance, to put him on a par with the service generally. Some allowance of the kind is or was made in Berar, and the cost of servants and living in Burma is very high, quite as high as in Berar. An Assistant Commissioner on Rs. 250 can live in the Punjab, the North-West Provinces, and Oudh, and also in Bengal; but with Burma prices it is a perpetual struggle.

Assistants here are worse off than in India.

Whereas we ought to make the service in Burma popular.

Consequently every assistant sent to Burma thinks himself (and is really) worse off than his brethren in India, and tries to get back. Whereas this important service—it is by far the most important forest charge under the Government of India—should be made popular and able to secure some of the best men.

No reason why it should not be so.

There is nothing to prevent this being the case otherwise. The idea that the climate of Burma is worse than the climate of the plains of India generally, is nonsense.

SECTION IV.

OF THE FOREST RULES.

Existing code.

281. The remarks made in the previous sections will sufficiently explain the main provisions of my new draft of forest rules.

At present the existing rules in force contemplate only the general preservation of the *teak trees* as an individual species over an enormous area of country, and contain a provision to prevent toungyas from being cut in any locality where teak trees grow (Rule IX). They give also a power (Rule XIII) to form what are called Government reserved forests; the procedure for reserving such tracts is contained in the first schedule annexed to the rules.

There is also a provision which enables other trees to be protected (Rule XII), but the power given is so expressed as to present considerable difficulties in the attempt to exercise it.

The western forests.

282. These rules do not apply to the forests west of the Irrawaddy, which were leased out for long terms with permission to girdle.

The exemption of such forests from the sort of management contemplated by the rules does not of course deprive Government of its undoubted property in these forests, declared publicly by a notification of September 26th 1853 and never recalled.

Government rights in the western forests.

283. But the extraordinary decision has been given in one of the courts of law that because the *rules* have not been applied to these forests, Government has no right to apply the general criminal law regarding mischief, trespass, &c., to the protection of its property. This decision is tantamount to a ruling that Government is not proprietor of the western forests, for there can be no such thing as property where there is no law to protect it.*

Revised draft of rules made in 1871.

284. In 1871, I was asked by Mr. Brandis, Inspector General of Forests, to make a revised draft of rules. I did so, but with the exception of replacing the western forests under the rules, the draft did not alter the law regarding the forests, and was principally devoted to improvements in the control of timber in transit, of the collection of duty, salving timber, and so forth.

The history of the draft rules.

This draft of rules having been submitted for opinion to the Legislative Department (apparently), *without* my note explaining the objects and reasons and the means of making the rules legal, it was examined by that Department and tested by the wording of Act VII of 1865 alone. As the rules were not drawn up with any attempt to conform them to Act VII of 1865, they were, as was to be expected, severely condemned.

Rules condemned owing to a misunderstanding.

Subsequent experience gained on the subject

285. I have since visited the forests, and have, moreover, seen the existing rules (which, as I have said, were reproduced in my draft *verbatim* in most instances) put under fire in a series of criminal trials, acutely defended by one of the best barristers in Rangoon. I have thus been able thoroughly to test their defects both as regards their efficiency in wording and the system of forest treatment which they prescribe.

led to the abandonment of the draft proposals.

286. The former class of defects proving numerous, and the foregoing sections giving my views as to the requisite alterations in regard to the latter, I am glad that the revised draft met with this check, and I have prepared a new code which I am now to describe.

Digression as to the legality of the present code of rules.

287. One thing, however, came out in the criticism of the amended draft which must be noticed before I proceed to the new code, for it is a point which must be clearly decided.

Several of the existing rules must be illegal, as they are *verbatim* the same as those objected to in the revised draft, and these too are not rules regarding foreign timber and such matters but regarding *forest* matters. For instance, Rule II, as it stands, is illegal, so is the second clause of Rule VII—a rule essential to the preservation of the forests. Rule VIII is declared *ultra vires*, Rule XIII is perfectly illegal as regards closing roads. Though Rule XV escaped criticism, it seems illegal also.

This is *not* given as the opinion of the writer of this report; it is the result of what is distinctly stated by the Legislative Department—taking the rules in

* See the subject further detailed in Appendix A to this report.

the existing code which correspond *verbatim* with those declared illegal in the revised draft, and excluding those which are illegal only by reason of their reference to foreign timber.

River and timber rules at present excluded.

288. The subject of river control and timber duty is now entirely separated from the *forest* rules, and a separate code of rules on such subjects has been prepared and submitted by me, with a detailed statement of objects and reasons.

A 'forest' code can be issued under Act VII of 1865.

289. I proceed, then, to consider the new code of forest rules, which, I think, can be issued legally under the Forest Act VII of 1865. If, however, my views regarding the requirements of the law are not correct, then I confess I do not see how any suitable rules for Burma can be made under Act VII.

Government right to all forests in Burma.

290. All waste lands in Burma are practically 'forests,' and all forests that have not been distinctly granted away or sold by valid and lawful grant or conveyance are Government property, and have been declared so in Pegu by a notification, 26th September 1853; the same is true of Tenasserim, which was annexed at an earlier date, though I cannot trace the notification (*vide* annual report for 1868-69, paragraphs 63 and 27).

Forest "rights."

291. There are no such things as forest *rights*, properly so called, held by individuals or communities over any forests in British Burma.

No misunderstanding should be allowed on this subject.

But "privileges" *allowed* by Government.

The villagers and townspeople have been always accustomed to get firewood and certain kinds of building wood and so forth from the forests nearest and most easily accessible to them, and no one would dream for a moment

Such privileges must be maintained.

(especially where we want to attract settlers) of arranging our forests on any system but that of maintaining such privileges, and my proposals are not only made with a view to their maintenance, but to their extension and to increased facility for enjoying them.

But privileges are not rights.

292. But these things are not *rights*. No one has ever questioned that Government is unrestricted owner of the forest and all that it contains. No one has ever doubted the right of the Government to prohibit trespass on any plot of forest it wished to preserve, or prohibit the felling of any kind of tree it chose to keep.

The defects of Act VII of 1865 do no harm as regards Burma.

293. Hence, as far as that unfortunate clause of Act VII of 1865 in regard to rights of individuals, which affords such an obstacle as to make the Act almost a dead letter in India, has no evil effect here. If only the notification of forests as Government forests now proposed, is sufficient under section 2 of the Act, the rules following will meet the case.

Necessity for including in a code of rules many matters which are purely "executive."

294. One other point has to be noticed. Every code of forest rules must of necessity contain many directions that could be prescribed by the executive Government without the Act's authority.

These rules cannot be separated where they relate to the same subject, or where the subject is not completely provided for without their insertion. It is not possible to have two codes, one of executive orders, one of orders authorized by the Act. No one could obviate the confusion that must result.

Nor does Act VII of 1865 require such separation.

295. Nor is such separation legally necessary. As long as such rules do not *contravene* the Act by dealing with matters foreign to its scope, and do not prescribe or define what is not lawful otherwise, there is no valid objection to them. Nothing is said about rules being *under* the Act, in section 3. All that is necessary is—

Conditions required by Act VII.

(1).—They must be "*in respect of the matters*" declared in section 4.

(2).—They must not be "*repugnant to any law in force.*"

I have to subject the legality of my new code to such tests and to *no others*.

Legality of the new rules tested by Act VII.

296. The first chapter classifies the forests; it describes the object and purpose of each class of forests, so as to define the terms "Ordinary Reserve," "Special Reserve," and "District Reserve"—the threefold classification of forests which is necessary, if my conclusions in paragraphs 91 to 146 are sound.

Object of the definition clauses.

It is essential that forest officers and the public generally should understand the aim and object of the system. The rules which are to guide them must therefore start with an exposition such as that contained in the definition clauses, or the rules that follow will be unintelligible.

297. Chapter II is occupied with the selection and treatment of ordinary reserves, or those Government forests the great object of which is preservation for climatic benefit. Chapter II. Rules for "ordinary reserves."

298. The process for reservation hitherto in force has worked badly; so much so, that although year after year orders on the different reports have urged the reservation of forests, it has only been since May 1870 that anything has been done. Former system of reservation cumbrous and impracticable.

The amount of writing on the subject is truly wonderful. After *six years* of consideration (British Burma Resolution 164-31F, dated 10th May 1870), during which the destruction of teak was going on apace, a few reserves were finally settled, and those scattered patches, some of them little blocks from 241 to 749 acres!

299. The process was far too cumbersome; it involved a *previous* topographical survey of considerable pretensions, and an elaborate valuation survey with a formidable array of tabular statements and schedules. The whole papers had first to go to the district office, then to that of the Commissioner, and lastly to Government. In one case the papers took a whole year to get through the district office; * in another, the whole work which had been anxiously pursued, I think during three seasons, was upset and objected to by the Deputy Commissioner, who refused, in general terms, to agree to the proposals. It was quite clear no forest officer had ever consulted with him carefully and caused him thoroughly to understand the climatic value of the forests; the deadly change † that was coming over the north-east districts, nor the need of preserving the teak, the area of which is scattered (see paragraph 102).

300. Here then was all the work of the department, all the labor, time, and expense of mapping, survey, inspecting and reporting simply thrown away. The results.

301. These results cannot be accepted as satisfactory. It is equally impossible to have time, money and labor thrown away, and to have the district and forest officers in conflict. (See further paragraph 297 (section 4) on this subject.) Necessity of a cordial understanding with district officers.

302. The principles and objects of the reservation of tracts, as indicated at paragraphs 91, &c., must be understood by both, and the general outline and position of the proposed reserve laid before the district officer, and thoroughly discussed with him. For such a purpose no special preliminary survey is necessary. A large rough sketch map showing the position of villages likely to be affected, and so forth, is all that is required; and the district and forest officers must sit in council over this, and where convenient might visit together any portion of the boundary likely to cause a difficulty. *Each must understand the other's point of view, the difficulties that each wishes to avoid, and the objects that each has in view.* The general extent and natural boundaries of the reserve being in this way agreed upon, the report contemplated by the rules will give all the information that can be necessary to enable the Government to decide on the question of reservation. During the period which must necessarily elapse before that decision is given, the rules provide for a temporary prohibition of cultivation, &c., to maintain the *status quo*. Much difficulty has been experienced in the past, owing to new villages and 'toungyas' making their appearance in a proposed reserve, *pending* the settlement of the proposal for reservation. How reserves ought to be settled,

303. The prohibitive rules proposed for such "ordinary" reserves are practically few, and as simple as possible. They extend to preserving 'valuable kinds' of trees, of which a list is given,‡ clearing for 'toungyas' is prohibited, and the collection of forest produce (which is often done in a very wasteful way, injurious to the trees which produce it) is subjected to regulation.

304. The next Chapter, III, deals with "Special Reserves." The extent of these will be very limited. Often they will be included in an area taken as an ordinary reserve, and where not so, the procedure is the same. Seeing that the reserves will be the places wherein expenditure has to be incurred to restore Rules for special reserves.

* Prome reserves. I learned the other day that they have not gone out of the district office yet.

† I really do not think this a phrase too strong or even fanciful.

‡ One would suppose, from the former application of teak to every conceivable purpose, that no other wood in Burma was above the quality of touchwood. The rule is worded to prohibit dragging or removing timber, as well as cutting, &c. In many of the recent forest cases we caught people *dragging*, though we could not find the people who had *cut*; the existing *forest Rule* 6 could not touch them, because "dragging" is not included!

and convert them into good compact forests, the rules provide for certain additional information to satisfy the Government of the fitness of the places to be so treated.

305. The locality being once arranged generally with the district officer's consent, the further details of fitness are professional matters, of which the forest officers are the judges.

More complete protection necessary for special reserves.

306. As a matter of course, in these limited special reserves, subjected to a somewhat high cultivation, there must be a total prohibition of everything that infringes the absolute right of the State therein.

Every species of trespass is thus prohibited. And great care will have to be taken to prevent damage by the Burmese "Môkso," who is in the habit of *burning the forest*, and is therefore amenable, if he persists in trying to do so, to the Rule 5, prohibiting the carrying and kindling of fire. But this is obviously necessary.

Cultivation.

307. *Cultivation* is absolutely prohibited, subject only to certain necessary exceptions.

Roads and right of way.

308. The regulations regarding roads will be within the law. There is no such thing as a *private* right of way in any forest, and only in a few are these roads of such permanent institution as to be the right of the public. Winding and uncertain tracks traverse the forest here and there, often altered by the falling of a tree or the wearing of deep ruts, oftener still by mere caprice.

When necessary, the forest officer must consider the necessities of the case, the direction of traffic, and the places to be reached, but having made due provision for the public convenience in this respect, he should, under the sanction of Government, be able to prohibit the purposeless taking of tracks through and about the forest in all directions.

Damage in process of exploitation.

309. Damage done by elephants, &c., used in dragging would of course come under the general prohibition of injury, but as careless drivers and owners are likely to cause such damage in the process of extracting timber, &c., it was thought to give force and effect to the subject of a specific prohibition.

Fire-tracing and boundary demarcation.

310. The fire-tracing of the forest, as well as the erecting of boundary marks, are matters which of course Government can do in its own estates, but unless they are prominently inserted in the rules as things that must be done *nolens volens*, the idiosyncracies of some officers or the supineness of others may cause these essential preservative measures to be overlooked; a special reserve without the absolute exclusion of fire is an absurdity.

The rules are legal on this subject.

The rule is certainly one in respect of the matters declared in section 4, clause 1, and is not repugnant to any existing law.

Provision for a working plan.

311. The same remarks apply to, and the same necessity exists for, inserting the rule which relates to the treatment of the forests and its exploitation according to a "working plan;" and it is further provided that when the work is by permit for the exploitation of timber or wood, the amount of which is fixed in the plan, the permit-holder is to be furnished with means of reference to the plan, and its rules are to be terms of the permit agreement. The necessity for this provision is suggested by the recent correspondence in the Burma Company's case. Here it is repeatedly urged that the Company had "no notice" of the working plan, &c.

Exploitation of material how regulated.

312. The 4th chapter, regarding the working out of the produce of Government forests, is not intended to apply to district forests, for those at present must be left under a very general sort of control and at the discretion of the district officer. But in the other forests uniformity of procedure is necessary. The produce of forests may be classed as 'major' and 'minor;' the former being timber and wood, the latter being grass, bamboos, wood-oil, and so forth.

Major produce.

313. Major produce is taken out of the forest either (1) by Government itself, or (2) by some one authorized by a permit or some sort of agreement to do so.

Permits.

Which system is followed in any particular forest, depends on the working plan and on the orders of Government.* When extracted by permits, the permit will be either a "petty" permit for a few trees only, or a "general" permit for the whole exploitation of a forest or part of a forest under the working plan. Petty permits will be issued for local convenience' sake for ordinary reserves,

* See also Section 5 on Permits (*post*).

but not in special reserves, from which *all* material worked out is so at times and in quantities prescribed by the working plan.

Material extracted by Government direct.

314. When the material is extracted by Government it is disposed of, either in the forest, or out of the forest after transport to a depôt. In whichever place it is sold, it may be either by public auction or private sale on indent.

Rules for sales, &c., how provided for.

315. With much reluctance, I have excluded rules on such subjects from the code, because I fear that they could not be brought under any one of the subjects specified in section 4 of the Forest Act. Yet some of these matters are of very great importance in the management and preservation of the forests, and in maintaining order at timber depôts.

If material is sold in the forests, it must be moved away within a certain time, or forest work is interfered with. A timber depôt also must be cleared of sold-off material; and we ought to be able authoritatively to clear material out, or it should lapse to the State; payments made on account of it, lapsing to Government as liquidated damages, for expense, by loss of time, inconvenience, &c.

Must be issued as executive Government orders.

316. All I can therefore do is to ask the local Government to issue some such rules as here printed (Addendum 2 to this section) as an executive order, directing forest officers at the same time to see that in all notices of sale, or for tenders, as well as in the body of every lease, permit, pass, &c., these terms and conditions are clearly and unmistakably entered as terms of sale, &c., and rigorously enforced. The special attention of intending purchasers should be called to them.

Disposal of minor produce.

317. As regards minor produce, the issue of leases and permits to collect are provided for, this being a rule in respect of "prohibiting the collecting and removing of leaves, fruits, &c." (clause 1, section 4 of the Act). The expired permit is required to be returned, as its retention causes fraud.

Duties of the forest establishment.

318. The Chapter V relates to the duties of the forest establishments.

Nothing tends more to the orderly working of a department and to the practical interest that each member of it will take in the work, than for each man to have a certain share of work and responsibility which belongs definitely to himself.

For this purpose I have defined the executive charges of the forest and the names of the officers.

Official titles and designations.

319. It is highly inconvenient not to have an officially recognized meaning attached to the terms 'division,' 'sub-division,' 'range,' and so forth.

Present confusion in names of divisions.

320. At present the nomenclature is confused, the words 'district' and 'sub-district' are used not always to signify the local charge of some class of official, but sometimes to mean a working division of a forest, such as 'block' or 'compartment;' sometimes to mean a whole group of forests, and sometimes to distinguish a part of one forest; and at best the term is likely to become confused with the "civil district."

Present confusion in the official titles of forest employés.

321. So also the official designation of officers. Besides the controlling staff whose titles are recognized, we have 'forest ranger,' 'native assistant,' overseer, sub-overseer, forester, assistant forester, peon, assistant peon, to say nothing of men at the depôts called tindals, lascars, depôt goungs, and so forth. I have proposed to simplify all these. We shall recognize "forest ranger," "forester," and "forest guard,' and no other titles. Any forest officer may be in charge of a timber depôt or revenue station, and may have charge of collecting duties, under any timber duty law that may be in force. He does not, however, cease to be a forest officer, nor in the case of the Deputy and Assistant Conservators, does any one think of changing the official title on that account. Still, if in the case of subordinates it is thought better to have a distinction (especially in Burmese), it will be easy to add a word signifying the special duty, such as 'depôt forester,' 'depôt guard,' and so forth.

Power of appointment, &c.

322. The statement that the controlling staff is appointed by Government is a mere recitation of fact and designed to complete the subject and introduce what follows, *viz.*, that the Conservator of Forests, and in some cases the divisional officers, have the same duties to perform as regards the subordinate staff. This for years has been the practice, but it has nowhere been authoritatively laid down as far as I am aware. On this point a question was raised at one of the recent trials of a forest ranger. The Criminal Procedure Code (section 466) draws a distinction in the prosecution of officials according to their appointment, hence the subject has to be provided for.

Uniform.

323. The wearing of some kind of simple uniform is prescribed for the subordinate officials. It should be of such a nature that it is not repugnant to the taste of the people, or else it will be put on only when a superior officer's visit is imminent, and thrown off on ordinary occasions, just when most wanted to be worn.

Necessity for it.

Such a uniform is insisted on for the police, and the same reasons precisely demand it for the forest officials, who are in many respects 'forest police.' No one can know the authority and position of a man who wanders about a forest without any mark of his position.*

It is not so necessary in the case of the controlling officers, as they will always be accompanied by some subordinate who has the distinctive marks of his authority.

Summary of duty.

324. Then follows a brief summary of the duty of each class of officers, with the nature of the charge he holds, and what he has to do in that charge.

Reasons for the Rules 43—58.

325. It is convenient thus to define duty, not only for the sake of the officers themselves, but in case a charge is brought against the officer of neglect of duty. At the recent trials it was observed that in the existing code, the duty of a forest ranger is laid down, but there is no similar information given as to what a Deputy Conservator's duty is.

The question also arose—Is a Deputy Conservator or an Assistant or a ranger 'entrusted with dominion' over the Government property in the growing trees of the forest, so as to be guilty of criminal breach of trust in case he makes away with some trees or allows any one else to do so?

326. I have, therefore, described the duties of *all* classes, and specified how far the trust extends.† I do not think a forester or the guard who goes with him is '*entrusted* with any dominion over the property,' but the forest ranger is; he has a higher sphere of duty, and may issue in some cases petty permits to fell; he has also the direct executive and responsible (though subordinate) charge of the ranger.

327. As regards the Rule 57 it is convenient that any officer may exercise the duty of the inferior grade where necessary. If a Conservator of Forests is alone in a forest or merely with his office people, it may be convenient for him to seize an offender whom he catches in the act, although this duty would ordinarily be that of a forester.

So also it is desirable that forest officers should aid as such *wherever they may be*, in their own beat or elsewhere, in extinguishing fire and preventing crime, and this is provided in Rule 56. The power to arrest offenders without warrant, and applying to the magistrate, &c., is already given in section 6 *et seq.* of the Act itself, and of course is not repeated.

Penalties.

328. The penalty chapter in brief; there is no object in a nice discrimination of forest offences, the trifling penalty which is the maximum shows that it is only intended to be applied in petty, or at any rate minor cases; and it may be safely left to the discretion of the magistrate to inflict the proper fine in each case.‡

Necessity of clause saving the action of other laws.

329. I have, however, maintained a clause which is necessary, and which is certainly not repugnant to any law in force, and is merely explanatory of the rule. The prosecution need not be for a breach of the *rules* where the act prosecuted also constitutes a breach of the general criminal law. It cannot have been the intention of the Legislature by providing a penalty under the Act to bar the operation of the Indian Penal Code. Yet this question was

* In France, it is an absolute necessity that the forest officer who charges a man with an offence and draws up a *proces-verbal* should state that at the time he was duly appointed and in uniform; and the document runs "Nous soussigné N— garde forestier, &c. &c., assermenté et revétu des marques distinctives de nos fonctions, &c. &c."

† *Note.*—To answer an objection which may be raised; why I say nothing in the rules about the duty of forest officers to become acquainted with the principles and details of their profession, and constantly to inspect, make observations, and so on, with a view to enlarging their own experience and gathering information for the benefit of forest science generally. These subjects are not added because they are matters of course, and moreover are not matters for neglect of which a man could be punished criminally. All that we can put in rules which involve a fine for their breach, is some matter of positive and definite duty, such as making a report, rendering a certain account of property, and so forth.

‡ It has been remarked on my rule that nothing is said about the power of a divisional officer *to fine*, in his executive capacity, his subordinates for neglect of duty, &c., in cases when it is not necessary or advisable to prosecute them formally for a breach of rule. Such a power is stated in the Public Works Code, but as such it has no legal force, only it becomes a *term of the contract of service* which every one makes who enters the service with the code before his eyes. It is certainly necessary that such a power should exist, but I could not introduce it into a code of rules under Act VII of 1865. It must be made a matter of rule prescribed as a term of service to every subordinate employé when he is entertained.

actually raised at one of the Tonghoo trials and is always liable to be misunderstood. If it cannot be legally stated in the rules, a judicial circular should issue on the subject. It is absurd that a man who maliciously or knowingly sets fire to 100 acres of full-grown pure teak forest—say fifty trees with 80 cubic feet each to an acre, and so worth about four lakhs of rupees—should be punished in no other way than for a breach of the forest rules, or that a permit-holder who girdles 3,000 trees in a forest, and obtains by a forged order the Government hammer to mark them with (so that they may falsely appear to have been properly girdled), should escape with no other penalty than Rs. 500 fine.

ADDENDUM No. I. TO SECTION 4.

Proposed Notification under Section 2, Act VII of 1865.

ALL waste lands covered with trees or shrubs in British Burma, which have not been disposed of by lawful and valid grant or sale to private individuals, and all plots of land belonging to Government taken up to form plantations in British Burma; all groves in the vicinity of public wells, springs, tanks, public buildings, and places of public resort; and all avenues of trees or strips of forest along public roads, or on the banks of streams and other waters, are defined to be Government forest for the purposes of Act VII of 1865.

The Notification No. 15F, dated 2nd August 1865, is cancelled.

FOREST RULES FOR BRITISH BURMA, 1873.

THE following rules for the better management of the Government forests in British Burma, drawn up under Act VII of 1865, have been confirmed by the Governor General in Council, and are, in accordance with section 6 of the Act, published for general information.

CHAPTER I.

OF THE CLASSIFICATION OF GOVERNMENT FORESTS.

1. All Government forests which are maintained for the supply of timber and other forest produce, or for the purposes of shade and protection, are called "Forest Reserves." Three classes of Government forest.

Forest reserves are either—

(1)—Ordinary Reserves.
(2)—Special Reserves.
(3)—District Reserves.

"*Ordinary Reserves*" are those which are maintained primarily for the preservation of natural moisture, the retention of the soil on mountain ranges, and for protection against landslips; for the preservation of the banks of streams, rivers, and other waters, and for the maintenance of the water-supply therein; for the protection of land against shifting sands, and damage by flood and diluvion. They are in a secondary degree only intended for the supply of timber and other forest produce; they are subject to such general protection as is hereinafter prescribed, suitable to maintain them in a state sufficient for their purpose as above defined. "Ordinary reserves."

"*Special Reserves*" are those which are maintained primarily for the production and yield of timber, wood, fuel, and other forest produce for the benefit of the State and the supply of the market, and further to fulfil the purposes of the *Ordinary Reserves*. They are subject to such special protection, and to provisions for their reproduction, treatment, and working, as are hereinafter prescribed, suitable to maintain them in the condition of the greatest and most beneficial permanent yield. "Special reserves."

"*District Reserves*" are those which are maintained for the purposes following:— "District reserves."

(*a*)—Forests and plantations in the vicinity of towns and villages, and which, though they are the property of Government, are designed to supply timber, wood, fuel, and other forest produce for the use and convenience of the inhabitants of such towns and villages.

(*b*)—Groves, plantations, and avenues for ornament or shade in the vicinity of roads, public buildings, and places of public resort, or for the maintenance of the banks of springs, streams, tanks, and other waters, and of the water-supply therein.

(*c*)—Plantations in course of formation by district authorities, designed, when grown up, either to form *District Reserves* of the classes (*a*) or (*b*), or to be treated as *Special Reserves*.

2. The administration and control of *Ordinary* and *Special Reserves* is vested in the officers of the Forest Department. Administration of the forests.

3. The administration and control of *District Reserves* is vested in the civil and revenue authorities of districts, subject to such general or special provisions regarding inspection and advice as are contained in these rules, or as the local Government may from time to time prescribe. Administration of district reserves.

4. A list of the names of forests constituting the *Ordinary* and *Special Reserves* for the time being shall from time to time be published in the official *Gazette*. And lists of all *Ordinary*, *Special*, and *District Reserves* in each civil district shall be maintained, and be open to public inspection in each civil district office and in each forest divisional office. Forest lists to be published.

5. In these rules "minor forest produce" means and includes bark, leaves, grass, bamboos, wax, oil, resin, gum, varnish, honey, tusks, horns, and skins; seeds, fruits, stones, lime, and every kind of forest produce, except wood and timber. "Minor forest produce."

CHAPTER II.

OF ORDINARY RESERVES.

6. Whenever it appears to the Conservator of Forests desirable that a tract of Government forest should be maintained and treated as an *Ordinary Reserve*, he shall consult with the civil district officer or officers within whose district the reserve, or part of it, is situate, and shall submit to the local Government a report prepared jointly by him and such officer setting forth the local name, position, estimated extent (if not otherwise known), and natural boundaries of the forest, and the reasons for its treatment as such reserve; and if the local Government is satisfied— Procedure in demarcating an ordinary reserve.

(1)—That the tract is suitable for the purposes of an *Ordinary Reserve* as defined in Rule 1, and

(2)—That its reservation will not offer undue impediment to the spread of population and cultivation of waste land, and will not cause hardship to existing villages and communities as regards the supply of forest produce for purposes domestic and agricultural,

it may sanction the formation of such reserve.

7. Pending the settlement of question of reservation, a preliminary notice shall be issued through the officer of the district in which the proposed reserve, or any part of it, is situate, prohibiting any new toungya clearings, any new cultivation, establishment of new houses or villages within the proposed boundaries, until the orders of Government are issued. Preliminary notice to maintain the *status quo*.

Demarcation and final notice.

8. On sanction being given, the Conservator of Forests shall determine whether demarcation by pillars or other artificial marks is necessary, and if it is, shall proceed to cause the demarcation. A final proclamation shall be then issued and made known in the vicinity through the officers of the district or districts in which the reserve, or any part of it, is situated, setting forth the boundaries of the reserve, and warning all persons against the acts prohibited by Rule 9.

Acts prohibited in ordinary reserves.

9. The following acts are prohibited in *Ordinary Reserves*:—

I.—Girdling, felling, lopping, stripping off leaves, barking, burning or otherwise injuring and cutting up or dragging trees or timber of the valuable kinds following, that is to say—

Kyoon (teak)	...(*Tectona grandis.*)
Thitká or Kathitká	...(*Pentace Burmanica.*)
Thitkado	...(*Cedrela toona* and varieties.)
Thinghân and its varieties	...(*Hopea odorata, &c.*)
Yemmanay	...(*Gmelina arborea.*)
Thitsê	...(*Melanorhœa usitatissima.*)
Kanyen	...(*Dipterocarpus alata.*)
Thinwin	...(*Rosewood.*)
Shaw	...(*Hibiscus macrophyllus.*)
Pyimma and Laihza	...(*Lagerstræmia.*)
Kokoh	...(*Albizzia lebbek.*)
Pingado	...(*Xylia dolabriformis.*)
Padouk	...(*Pterocarpus dalbergioides.*)
Shâh	...(*Acacia catechu.*)
Eng	...(*Dipterocarpus tuberculata.*)
Hmâyâ	...(*Grewia microstemma.*)
Bambway	...(*Careya arborea.*)
Yindeik	...(*Dalbergia cultrata.*)
Anân	...(*Fagræa fragrans.*)

without permission according to the rules contained in Chapter V. The local Government may from time to time add other species to the list.

II.—Setting fire to the forest, or negligently allowing fire to spread to the forest; negligently lighting or leaving alight camp fires; dropping embers on the ground; kindling kilns or burning lime or charcoal without permission under Rule 39. Hunters are prohibited from setting fire to the forest.

III.—Clearing toungyas, except with permission, as in Rule 17, clause VI.

IV.—Injury to the soil by removing turf, vegetable mould (humus), dead leaves, and the like.

V.—Damage, negligent or wilful, by elephants, buffaloes, bullocks or otherwise, in process of working or extracting forest produce.

VI.—Sawing up or conversion of timber, burning, marking or defacing, or altering marks on timber or trees in the forest without permission of the officer in charge of the forest division.

VII.—The collection of minor forest produce *other than* grass and bamboos, shall be effected only with permission previously granted as hereinafter provided.

Closing forest against grazing (*ordinary reserves*).

10. The Conservator of Forests may (when such a course is necessary) close any part (giving due notice thereof) of any ordinary reserve against grazing, pasturing, and trespass by cattle.

11. Except as above provided, the use and collection of wood and forest produce is free and unrestricted, provided also that the produce is taken for the use of persons collecting it, and not for export or merchandise, and provided that it is taken in such reasonable quantity as not to denude any part of the forest, or endanger the object of the reserve.

Working plan for ordinary reserves.

12. The proper treatment of "*Ordinary Reserves*" shall be provided for by such general working plans as may be necessary; such plans in all cases fixing the quantity of timber removable otherwise than as single trees or for petty demands, if there is a stock suitable for such removal. *Ordinary Reserves* shall be fire-traced where possible, and otherwise protected from the ingress of fire, as the Conservator of Forests may direct.

CHAPTER III.

Of Special Reserves.

Procedure in demarcating a special reserve.

13. Whenever it appears to the Conservator of Forests desirable that any Government forest should be treated and maintained as a *Special Reserve*, he shall submit a proposal to the local Government stating the position, estimated extent (if not otherwise known), local name and boundaries of the proposed *Special Reserve*, and its forest capabilities; and if the terms of such proposal satisfy the local Government—

(1.)—That the produce of the tract is sufficiently valuable, *or* that its soil and other conditions are such as to render it capable of supporting valuable produce, and that its extent is such as to make it worth while to preserve.

(2.)—That its position as regards export lines, vicinity of markets, and the like, is favourable.

(3).—That no rights exists within it, *or* if they exist, a suitable arrangement for their extinction by exchange or compensation will be agreed to by the right holders;

or that the rights can conveniently be expropriated by the law for the time being in force;

or that the rights have been ascertained correctly and defined in writing, and found to be such as do not interfere materially with the proper treatment of the forests,

then the formation of such special reserve may be sanctioned. *Provided* that if the proposed special reserve is not included in an area already sanctioned as an ordinary reserve, the provisions of Rule 6, regarding consultation with the district officers and the submission of a joint report, shall be complied with.

Preliminary notice to maintain *status quo*.

14. Pending the settlement of the question of reservation, a preliminary notice shall be issued as provided in Rule 7.

Demarcation.

15. On sanction being given, the Conservator of Forests shall, if the reserve is not sufficiently demarcated by permanent roads, streams, or other existing boundaries or landmarks, cause the same to be marked out by distinct and permanent boundary marks, bearing a serial number.

Final proclamation.

A final proclamation shall then be issued through the officers of the district or districts in which the special reserve, or any part of it, is situate. Such proclamation shall be publicly made known in the vicinity of the reserve, and shall indicate the boundaries of the reserve, and shall further warn all persons against any trespass or infringement of the forest rules regarding such reserves.

Power to close useless tracks and pathways.

16. The Conservator of Forests may, with the sanction of the local Government, determine what roads and pathways through a special reserve shall be authorized for public traffic, and may close all other tracks and pathways, giving notice in the vicinity of such closing.

Acts prohibited in special reserves.

17. The following acts are prohibited in special reserves:—*

I.—Setting fire to the forest, or kindling any fire in the vicinity thereof in such manner as to endanger its safety.

Lighting camp fires, except on cleared camping places, which will be prepared for the purpose where the extent of the reserve renders it necessary for travellers to halt in it.

Burning lime, charcoal, or bricks in the reserve, or so near to it as to endanger the forest, without permission under Rule 39.

II.—Kindling or carrying any fire between 1st February and 1st June, except at cleared halting places as aforesaid.

III.—Trespass by men, elephants, or cattle, off the authorized roads and pathways.

IV.—Girdling, felling, lopping, burning, injuring, stripping off leaves, barking, or tapping for oil, varnish, or resin, any tree, and moving or dragging any timber otherwise than at a regularly authorized working by virtue of a lawful order or permit according to Rules 32 to 35, as the case may be.

V.—Injury to the soil by removing turf, vegetable mould (humus), and the like.

VI.—*Toungya* clearing and every form of cultivation, except by written order of the Conservator of Forests, which may be issued to allow the same—

(*a*) With a view to subsequent cultivation of teak or other valuable forest produce.

(*b*) For the support of labourers located in the forest.

(*c*) For the support of subordinate forest officials located in the forest.

Breach of any conditions entered in such order, for the safety of the forest, shall be deemed to be a breach of this rule.

VII.—Sawing up or conversion of timber, or burning, marking, defacing, or altering marks on timber or trees in the forest without the permission of the officer in charge of the forest division.

VIII.—Grazing or pasturing of cattle, elephants or pigs, except by permission of the officer in charge of the forest division under Rule 40.

IX.—Damage, negligent or wilful, by elephants, buffaloes, bullocks or otherwise, in process of working or extracting forest produce.

X.—Minor forest produce shall be collected only by lawful permit issued under Rules 35 to 38, as the case may be.

Fire-tracing of special reserves compulsory.

18. Special reserves shall in all cases be efficiently fire-traced with such external and internal cleared lines as the Conservator of Forests may deem necessary, and shall be fenced in places where, from the vicinity of a frequented road or otherwise, trespass by men or cattle is especially apprehended.

Detailed working plans.

19. The local Government shall prescribe for the special reserves, either singly or in such groups as may be deemed proper, or in connection with ordinary reserves, a working plan which shall define—

(1.)—The system of general treatment and reproduction, whether for high forest, coppice, or otherwise.

(2.)—The method of exploitation and utilization of material, including the regulation of pasture, and of the collection of minor forest produce.

(3.)—The system of artificial cultivation of trees, where necessary to resort to it.

(4.)—The systematic distribution of the various works to be carried out, over the appropriate years of the different periods.

* Special Reserves being a small area under planting and other 'intense' treatment, it is absolutely necessary to prohibit *all* sorts of trespass; above all, to keep out men and cattle from trampling down the young seedlings.

The working plan shall make provision for its periodical revision.

Working plan, provisions to be given to permit-holders.

20. In any case in which the exploitation of timber is effected by permit-holders having license to cut and remove timber under Rule 35, the permit-holder shall be furnished with such certified extracts from the working plan as may be necessary, and the same shall be terms of his permit or agreement.

CHAPTER IV.

Of District Reserves.

Reservation of lands for district forest.

21. Every officer of a district shall so arrange the issue of grants to cultivate waste land (under the law or rules for the time being in force) as to secure to each town, village or group of villages, such area of waste land (to be kept as forest) as shall be convenient and suitable to the objects of a district reserve of the class (*a*) decribed in Rule 1.

Supervision.

22. The district officer, acting under such general or special instructions as the Commissioner of the division may issue, shall make such arrangement for the supervision and protection of these reserves as may be necessary to fulfil their object, and may entrust myookes, thoogyees, village headmen, and other subordinate officials with the duty of protecting and supervising them.

Valuable trees not to be cut.

23. Valuable trees of the kinds specified in Rule 9, except cutch (*Acacia catechu*), shall not be cut in any way, nor injured, nor the timber thereof dragged or removed, and boat hulls shall not be hollowed out, without the orders of the Deputy Commissioner, or some one authorized by him to grant such orders, and on payment of such fees as may be prescribed in each district by order of the local Government.

Cutch how dealt with.

24. Cutch trees (*Acacia catechu*) not being included in any special or ordinary reserve, shall be dealt with according to the provisions of the revenue law with reference thereto.

Oil and varnish trees how protected.

25. The kanyen and thitsi trees in each district shall be grouped into convenient circles, and the right of preserving and working them for wood-oil and varnish shall be sold by triennial lease by the Deputy Commissioner.

The right of collecting honey and bees' wax shall be leased or granted according to the practice heretofore prevailing in each district.

Forest produce is free otherwise.

26. Except as provided in the preceding rules, all forest produce in district reserves shall be free, provided it is used locally for the domestic or agricultural wants of the persons taking it, and not for purposes of mercantile profit.

Protection of tree, and roadsides.

27. No trees shall be felled, lopped, burned, tapped, cut or injured within fifty feet of either side of any public road, or of any stream, canal or creek. The Deputy Commissioners of districts (subject to such general or special instructions as the Commissioners of their divisions may see fit to issue) shall determine and notify publicly what roads, streams, creeks, and canals in their districts are subject to this rule.

And at public places

Subject to similar instructions, the Deputy Commissioners of districts shall determine what groves of trees shall be maintained in the vicinity of springs, wells, pagodas, zayats, and public buildings, and no tree in groves so maintained shall be felled, lopped, or injured without the express orders of the Deputy Commissioner.

The provisions of this rule may be also applied by order of the local Government to railways, and river or other embankments.

District plantations.

28. The Deputy Commissioners of districts may cultivate suitable tracts of Government waste land as plantations of valuable trees. When formed and completed, the local Government shall determine whether such plantations shall be kept as district reserves or managed as special reserves,

29. Such plantations shall ordinarily be made under charge of the thoogyees, and a commission at such rate and on such area or number of trees successfully reared as the local Government shall prescribe, shall be payable by the Deputy Commissioner to the thoogyee in charge, on certificate of the forest officer appointed in that behalf, that he has inspected and is satisfied with the work.*

CHAPTER V.

Of the working out of Timber and other Forest Produce in Special and Ordinary Reserves.

A.—Of the extraction of timber and trees.

Method of obtaining timber.

30. The rules in this chapter apply to ordinary and special reserves only, unless the local Government shall otherwise direct.

Special permit for trees.

31. Application to fell and remove single trees, or any number not exceeding ten, of the "valuable kinds" mentioned in Rule 9 in the case of ordinary reserves, or of any kind whatever in the case of special reserves, shall be made to the officer in charge of the forest division, who may issue a "*special permit*" on payment of such fee, for each tree, as may be prescribed by the local Government.

* It is contemplated that the fees, &c., derived from district forests should be formed into a 'district planting fund' out of which such commission and other charges could be paid; but I do not think the constitution of a fund is one of the subjects allowed to be brought into the rules, So it must be arranged executively.

The officer in charge of the division may delegate authority to grant special permits to any officer in charge of a forest sub-division, and may delegate authority to grant special permits for single trees only, to any forest ranger in charge of a forest range.

Form and conditions of special permits.

32. All such special permits shall be issued uniformly from a book furnished with a counterfoil, and shall specify the number of trees, the kind, the fee paid, the place of cutting, and the time within which the trees must be felled and cleared out.

The pre-payment of fees is in all cases compulsory. The special permit lapses absolutely on expiry of the time fixed, whether the trees have been felled and removal completed or not; and the trees, if not cut, and the timber thereof, if felled but not removed, revert to Government, but no person shall be entitled to recover any fee paid for the permit.

Restrictions on the issue.

33. An officer empowered to issue special permits may in all cases refuse the application whenever the working plan does not contemplate trees of the kind applied for being felled, or wherever he considers that the condition of the forest and the quantity of trees available warrant such refusal, or he may grant such smaller number than that applied for, as he thinks fit.

Working out trees in large numbers, &c., how effected.

34. In case of requisitions for more than ten trees, or in the case of a regular exploitation of teak or other timber under the working plan, the felling and removal must be made according to the system in force in the forests at the time, and according to the working plan.

Such system may be either—

(1.)—Felling and removing timber by permit agreements, in such form and in such terms as the local Government may direct.

(2.)—Felling timber by Government agency direct, and disposal of such timber either in the forest or at timber depôts after extraction and floating down.

B.—Of the utilization of minor forest produce.

Collection of minor produce.

35. The right to collect or utilize any kind of minor forest produce (the collection of which without permission is prohibited by Rules 9 and 17) may be granted either by "special permits" for limited quantities, or applying to certain portions of the forest, and holding good for short terms only, or by "general leases" or permit agreements, for a term of years.

Special permits.

36. Special permits may be issued by the same authority, in the same form, with similar specifications as to time, locality, sort of produce, and fee paid, and under the same conditions as special permits for trees under Rule 32, and they may be refused or restricted as provided in Rule 33.

The amount of fees shall be according to a scale promulgated from time to time by the local Government.

General permits.

37. General leases or permits to collect minor forest produce for a term of years may be issued by the Conservator of Forests, on such conditions as he thinks fit. Such leases or permits may be either sold by auction or tendered for, as the Conservator of Forests may from time to time direct.

Free permits to certain villagers.

38. Free permits, either special or general, may be issued to the headmen of Karen and other villages, in the neighbourhood of any ordinary or special reserve, authorizing the villagers to collect such produce for their own local use.

Such permits may be withdrawn by the Conservator of Forests in case of breach of forest law, or of the conditions entered in the permit.*

Burning kilns.

39. The burning of lime, charcoal, or bricks in ordinary or special reserves shall only be allowed by virtue of a written order from the officer in charge of the forest division. Such order shall contain the necessary conditions regarding fire-tracing and protection of the forest, and regarding the sort and quantity of fuel to be used for the burning, and how it is to be obtained.

Fees for each kiln may be charged as the Conservator of Forests may direct.

Breach of any condition of the order shall be deemed to be a breach of the prohibition in Rules 9 and 17, as the case may be.

Grazing permits.

40. Permits to graze cattle may be issued in special reserves, where consistent with the working plan, by the officer in charge of the forest division only.

Such permits shall be in writing, and shall specify the number and sort of cattle, the part of the forest to which they apply, the fees payable, if any, and the name of the person or persons who are to be held responsible in case of any damage or trespass contrary to the terms of the permit.

Return of expired permits.

41. All permits or orders other than those described in Rule 34 or Rule 37, shall be returned to a forest officer when the permit has been satisfied, or when the time of it has expired.

Permits not transferable.

42. No permit, or lease, or other written order, issued under this chapter, is transferable, except under special conditions entered therein.

* Those permits might be conditioned to give the Kyeydangyees, &c., the responsibility of taking care of the forest and of preventing fire and wanton damage as far as possible. We give them the free run of the reserved forest as well as the whole unreserved tract which is open to them, and it is not too much to ask in return that they should help to prevent damage.

CHAPTER VI.

Of Forest Officers and their Duties.

Forest establishment. Official titles.

43. The forest establishment is divided into "Controlling" and "Subordinate."

The controlling establishment consists of—

The Conservator	(Thit-tau-woongyee.)
Deputy Conservators	(Thit-tau-woon.)
Assistant or Sub-Assistant Conservators ...	(Thit-tau-woondouk.)

The subordinate establishment consists of—

Forest rangers	(Taw-oke.)
Foresters	(Goungwai.)
Forest guards	(Taw-soung.)

When such subordinates are posted to duty at timber stations or depôts, they may receive such addition to their official designation as may serve to indicate such duty.

No others to be used.

No other titles or designations shall be used or recognized officially.

Forest "Division."

44. A "forest division" is the charge ordinarily held by a Deputy Conservator or senior Assistant Conservator.

"Sub-division."

A "forest sub-division" is a charge subordinate to a division, ordinarily held by an Assistant Conservator.

"Range."

A "forest range" is a charge subordinate to a sub-division, or directly to a division, as the case may be.

"Beat."

A "forest beat" is a charge subordinate to a range, and is held by a forester, assisted by one or more forest guards.

No other charges recognized.

No other local division of charges shall be officially used or recognized.

Appointment and control.

45. The appointment, posting, degradation, and dismissal of the controlling establishments rests with Government, and of the subordinate establishment (within the scale and rates of pay sanctioned by Government) with the Conservator of Forests, or with such officers in charge of forest divisions as regards subordinates in such divisions, as may be authorized in that behalf by the Conservator of Forests.

Power of suspension.

46. The Conservator of Forests may suspend any forest officer (subject to report to the local Government, in the case of the controlling establishment) pending enquiry into any official misdemeanour or criminal charge, of which such officer is accused. The officer in charge of a forest division may exercise similar powers in respect of the subordinates in his own division (subject to report to the Conservator of Forests.)

Official uniform and weapons.

47. The official uniform and badges to be worn, and weapons to be carried, by the forest establishment, shall be determined by the local Government. Every member of the subordinate establishment shall wear some distinctive mark of his functions and authority when on duty.

Duty of Conservator of Forests.

48. The "Conservator of Forests" has the administrative charge and supervision of the whole of the forests, and works managed by the Forest Department, and of the establishments provided for them. He is charged with the control of the record of his office and other property of Government thereto pertaining. He is also charged with such duties of correspondence and examination and control of the provincial forest accounts as may be prescribed by the local Government, or the Government of India. He shall further inspect and report, or advise on all such matters, as the local Government may require.

Duty of a Deputy Conservator.

49. A "Deputy Conservator" has executive charge of a forest division, as defined in Rule 44, or of some special branch of work.

When in charge of a division, he shall be deemed to be *entrusted* with the Government property in the timber and other growing stock of the forests in the same manner as he is with the cash, stock, and other property in his charge.

It is also his duty—

(1.)—To keep all accounts, and to make all reports and returns, and to take due care of property in his charge; also to keep up such diaries and note-books, and conduct correspondence in such manner as may from time to time be prescribed to him.

(2.)—To use his utmost endeavours that the forest rules are not infringed; that the working plans and general orders regarding the preservation, treatment, exploitation, and reproduction of the forests in his division are efficiently carried out; and to see that all subordinates are at their posts and do their duty. He shall also report all serious cases of forest offences, or fire or damage to the forests, to the Conservator of Forests, and shall take the necessary steps to bring offenders to justice, and repair the damage done.

(3.)—To take proper steps to realize all royalty and other dues of Government.

(4.)—To make such special inspections and reports on any matter connected with forest work as the Conservator of Forests may require.

Duty of an Assistant or Sub-Assistant Conservator.

50. An "Assistant Conservator" in charge of a division has the same duties as above prescribed for a Deputy Conservator.

An Assistant or Sub-Assistant Conservator in charge of a sub-division is entrusted with the Government property in the growing stock of the forest in the same way, and has the same duties in the sub-division and the charges attached thereto, as a Deputy Conservator in a division, but subject to the lawful control and direction of the Deputy Conservator, and in correspondence with him. If not in charge of a sub-division, but specially or generally employed otherwise, he shall carry out his duties and employment under the orders of the Deputy Conservator of the division in which he is employed, or directly under the orders of the Conservator of Forests, as the said Conservator may direct.

51. A forest ranger, if in charge of a range, shall be deemed to be entrusted with the Government property in the timber and other growing stock of the forests in his range. Duty of a forest ranger.

It is also his duty—

(1.)—To live in or close to the forest, to be acquainted with every part of his range, and keep himself informed of what goes on in it; to report to his immediate superior the occurrence of any fire, forest offence, or damage to the forest.

(2.)—To visit and report to his immediate superior the state of all the boundaries and boundary marks in his range at least twice a year.

(3.)—To prevent by every lawful means in his power the commission or continuance of any breach of the law or forest rules, and to arrest the offender according to section 8, Act VII of 1865.

(4.)—To prevent forest fires by every lawful means in his power, and in the event of one occurring, to procure forthwith the needful help, and use every effort to extinguish it. Before and during the usual season of fires, he must carefully see the fire-paths and tracings are clear, and kept clear, of all inflammable matter.

(5.)—To seize all timber, wood, and other forest produce unlawfully cut, moved, collected, or reasonably suspected to be so, which he shall find in the forest or in transit therefrom, and deal with it, subject to such orders as he may receive from his divisional officer, according to sections 8 and 11 of Act VII of 1865.

(6.)—To see that all works of cutting or exploitation of timber, or collection of forest produce, grazing, cultivation, and all other works carried on in the forest, by virtue of the working plan or lawful orders of competent authority, are duly and properly executed without injury to the rest of the forest.

(7.)—To carry out all lawful orders of the officer to whom he is subordinate; to send in such returns and reports, and such accounts of all money entrusted to him as he may be required to do.

(8.)—To maintain a diary showing his journeys, occupation, and all noteworthy incidents, and to submit the same to his superior officer at such intervals as may be prescribed.

When on special duty or employment he shall execute such duty according to the lawful orders he may receive.

52. A *forester*, if in charge of a *beat*, has the following duties:— Duty of a "forester."

(1.)—To live in or close to his beat; to patrol it all over frequently so as to know it thoroughly, and know everything that goes on in it.

(2.)—To visit and report on the boundary marks in his beat at such intervals as he may be directed.

He has also the duties described in paragraphs 3 to 7, both inclusive, of a forest ranger's duty as far as regards his own beat.

A forester in charge of any special work, or employed in any special work, under a superior officer, shall carry out the work according to the orders given, and act according to the lawful directions of his immediate superior, as the case may be.

53. A *forest guard* has ordinarily to accompany and assist a forester in his beat.

He must live in or near the beat, and be ready at all times to assist the forester in his duties, and accompany him when patrolling. When the forester is not with him, he has the same duties as a forest ranger in respect of forest offences and fires (paragraphs 3 and 4), seizure of unlawful produce (paragraphs 4 and 5), and supervision of works (paragraph 6). Duty of a "forest guard."

It is his duty at all times to obey the lawful orders of his superior officers. When employed on any special work, he is to assist in such way as he may be lawfully required.

54. All subordinate officers in charge of special reserves shall regard it as a duty to be constantly on the watch, while out patrolling, to do everything in their power for the well-being of the forest. Duty of all subordinate officers regarding forest improvement.

They must *always* be armed with a suitable knife to cut creepers and parasites, prune off broken boughs, cut down teak saplings which have been trampled or broken by accident, to destroy noxious animals and insects; and during the proper season they should carry seed of teak and other valuable trees so as to be able to dibble it into the soil in blank places.

Controlling officers will specially notice the indications of this rule being attended to when visiting the forest, especially at *visits not previously announced*.

55. All forest officers, wherever they are, and on whatever duty or employment, have always the duty of preventing any offence against the forest law or rules, arresting the offender according to section 8, Act VII of 1865, extinguishing forest fires, and protecting the property of the State or of private persons while detained at or in charge of any Government timber depôt or station. Forest officer's duty to prevent offences wherever he is.

But in such cases they shall communicate what they have done to the officers in local charge as soon as may be, and the local officer shall take such further steps as the matter in hand may require.

56. Any forest officer may lay a complaint to the magistrate or to the police, as the case may be, apply for a confiscation under section 11, Act VII of 1865, in any case of the breach of the law occurring in his own local charge. But the officer in charge of the division may direct any other officer subordinate to him to complain or prosecute, or may conduct the case himself. Power to complain and prosecute.

57. Any forest officer of a superior grade may in case of necessity exercise all or any of the functions of the grades below.

58. No forest officer shall trade or engage in any agency business, or in any work or employment other than his duties as such forest officer, except with the permission in writing of the Conservator of Forests. Prohibition against trading.

CHAPTER VII.

PENALTIES.

59. For every act or omission contrary to any of these rules, or abetment thereof, and for every wilful neglect of duty on the part of any forest officer of the subordinate establishment, a fine not exceeding Rs. 500, or in default of payment, imprisonment as provided in section 67 of the Indian Penal Code.

But nothing in these rules is intended to prevent the prosecution of any person for any offence under the Indian Penal Code or other law to which he may be liable, and not under these rules.

60. One-half the fine awarded on any conviction for a forest offence may be awarded by order of the magistrate trying the case to the informer or other person in consequence of whose aid or information the offender was brought to justice.

ADDENDUM 2 TO SECTION 4. (*Vide para.* 311.)

Proposed orders regarding sale and disposal of the produce of forests worked by Government agency.

(A.)—Government timber or minor or forest produce worked by Government agency shall be sold or disposed of:—

(1.)—By private sale on indent, approved by the Conservator of Forests or officer in charge of the forest division in which the produce for sale is.

(2.)—By public auction in the forest or at a depôt, as the case may be.

(3.)—By free grant as hereinafter provided.

(B.)—Private sales shall not be effected at rates below the current market prices unless the Conservator of Forests shall otherwise direct. The Conservator of Forests shall from time to time send information to the divisional officers of the prices-current of the chief timber markets.

No private sale shall be deemed to be concluded, and no material shall be delivered on account of the same, unless and until the full amount of purchase-money is paid.

(C.)—At all public auction sales, a deposit not being less than 20 per cent. of the bid shall be paid on fall of the hammer; the balance shall be paid within one month in the case of timber, and one week in the case of other forest produce.

The timber or other material may not be removed till payment in full is made, but is nevertheless at the risk of the purchaser.

If the whole price is not paid within the time specified, the timber or other material may be resold, but the deposit shall not be returned, but shall lapse to Government as liquidated damages for inconvenience and loss of time.

(D.)—When the sale has been effected in the forest, the timber or other material must be removed under the supervision of the officer in charge, within such time after a final payment as may be fixed in the notice of sale. All timber or other material not brought out and removed within the prescribed time shall revert to Government, and no person shall have any claim to recover any sum paid as the price thereof, which shall lapse to Government as liquidated damages, for the danger to the forest, inconvenience or loss or risk consequent on non-removal.

The Conservator of Forests may in all cases grant a reasonable time in extension of the prescribed period, on due cause being shown.

When the sale has been effected at a depôt, the timber or other material shall be removed as aforesaid, failing which, ground rent, at such rates as the Conservator of Forests may from time to time determine, shall be charged; and a final period may be fixed, after which the material shall revert to Government and the payment lapse, as aforesaid.

(E.)—Timber or other material worked out by holders of permits or leases shall be paid for and otherwise dealt with according to the terms and conditions of such permit or lease.

(F.)—Free grants of timber shall be made only for *bonâ fide* public purposes, and subject to such restriction as the local Government may prescribe.

Such grants shall be in writing in the form prescribed in the schedule annexed [*to be drawn up hereafter*].

They shall be exercised within the prescribed time; and if any grant involves the felling and dragging of timber, or both, special conditions for the protection of the forest from damage shall be added.

Breach of such conditions causes the grant to lapse *ipso facto*.

SECTION V.

THE PERMIT SYSTEM.*

Systems of working.

330. The systems of extracting the timber from Government forests have hitherto been—

(*a*)—Working by direct Government agency.

(*b*)—By permits.

A proportion of the forests (in the Tharawaddy and Rangoon divisions) has always been worked by the first method as a safeguard against possible complications arising from the second.

The 'Government direct' system: contractors.

331. Under the direct system, contractors undertake to fell, cut up, and remove timber that has been girdled for them by the officers of Government, and to float and deliver it at Rangoon.

The contractors at the same time remove dead and fallen trees. The works are constantly visited, and recently a system has been adopted of causing all felling operations to stop by a certain date in the cold season, so as to enable the Government officers to make a thorough inspection of the wood before it is launched, thus detecting at once the felling of green timber or undersized trees. Moreover, as several contractors usually work in the same forest, mutual rivalry and jealousies tend to make each watchful of the other. A great deal of waste is also saved, because the contractors can be made to bring out every piece of timber that will actually pay its expenses, whereas permit-holders will only take the very best, leaving high stumps, half-cut-through trees, large top pieces, &c.; indeed, the waste of material was not the least conspicuous feature in the mal-administration of the Tounghoo permit forests.

Advantages of the system.

Utilization of *all* material.

Utilizing large and heavy trees.

Another possible advantage is, though it is one that has not been sufficiently pursued, is that contractors can be made to cut up and use the very large trees, which permit-holders invariably decline to use, although being the trees which have most decidedly attained maturity, these are the very ones it is essential to work out.

We can introduce sawyers and bring out squared timber, a proceeding infinitely preferable to the barbarous practice of cutting the timber in log into short lengths.

Comparative financial results of the two systems.

332. That the Government system pays better than the permit system, at present rates, the following table, computed for nine years back by Mr. J. K. Hume, Assistant Conservator, shows conclusively. Of course a rise in the rates of the permits might alter this, but there is reason to doubt whether the revenue rates now entered in the permits could be increased without materially affecting the readiness of the public to take permits. Nor is this all; the loss of Rs. 4-5 per log is an average which takes into account all the teak timber of all classes and qualities. Captain Seaton assures me that if we were to take into account only the first class and quality timber, which is what the permit-holders pick out, the loss would be much greater, I believe from Rs. 20 upwards per log; in some cases Rs. 30 and even Rs. 40! Why should Government suffer this loss?*

* Mr. Slym, Deputy Conservator at Moulmein, gives the following table of loss incurred:—

Name of Forest producing.	Average rate of permit fee per log.	Cost per log, if worked out by Government.	Average price realized.	Net loss by permit system.
	Rs.	Rs.	Rs.	Rupees per log.
Beeling...	7	18	35	10
Domdamee	7	16	35	13
Yonzaleen	10	12	36	14
Thoungyeen	10	22	38	6

Rates realized by Government during the past nine years, from timber brought out by permit-holders and contractors.

Year.	Timber by permit-holders.	Nett revenue to Government on permit timber per ton.	Timber by Government agency.	Nett revenue to Government on contractors' timber per ton.	Difference of Nett Revenue per ton in favor of		Remarks.
					Permit timber.	Contractors' timber.	
	Tons.	Rs. As. P.	Tons.	Rs. As. P.	Rs. As. P.	Rs. As. P.	
1863-64 ...	22,655	7 0 0	10,297	7 3 0	.....	0 3 0	
1864-65 ...	12,829	8 3 0	6,472	12 0 0	.....	3 13 0	
1865-66 ...	23,657	6 0 0	14,262	17 0 0	.....	11 0 0	
1866-67 ...	21,756	5 7 0	9,793	11 10 0	.....	6 3 0	
1867-68 ...	24,458	5 12 0	8,646	9 0 0	.....	3 4 0	
1868-69 ...	30,919	7 10 0	21,339	12 9 0	.....	4 15 0	
1869-70 ...	23,692	8 11 0	16,150	13 9 0	.....	4 14 0	
1870-71 ...	34,321	5 10 0	22,765	8 0 7	.....	2 6 7	
1871-72 ...	30,660	6 5 0	21,465	8 7 2	.....	2 2 2	
Average of the above nine years ...	....	6 11 9	.....	11 0 9	....	4 5 0	

333. The permit system is at present in force in the Prome, Sittang, and Salween divisions, and is almost coeval with the first attempts at forest management in British Burma. It began in the Moulmein division with a short and simple form of permit. The 'permit' system.

334. The advantages which the permit system proposed to offer were— Its advantages as proposed.

(1). That the work of Government officers, and consequently the expenditure on establishment, would be lightened.

(2). That what is called 'European enterprise' and trade were encouraged, and it was expected that capital would be thrown into the forests, and a new energy directed to improved methods of exploitation, whereby material previously supposed to be not available would by mechanical and other appliances be turned to account.

335. As long as permit-holders are contented with a moderate profit and work in a friendly spirit with the officers of Government, and do not require an intense preventive supervision, the first object is secured, but directly the permit-holder is disposed to work without caring for the forest, to strain every clause of his permit and quibble over its every letter, the supposed benefit disappears. First benefit lost where permits require close watching.

336. The second prospect has long since proved illusory. It has been everywhere found that permit-holders have contented themselves with working in the old native way; instances are extremely rare, if indeed they exist at all, in which any improvement in the way of utilizing a greater proportion of the total material of a felled tree, or of rendering available the resources of more difficult localities, has taken place. Some permit-holders indeed have introduced timber carts to improve the old process of dragging by elephants, buffaloes and bullocks. Some too fell and remove their timber by labour hired directly by themselves and properly supervised by responsible agents; this results in an honest, open system of work, but does not otherwise effect anything that the ordinary style of exploitation cannot compass. The second has proved illusory. No improvement in the style of working.

337. But many permit-holders merely stand in the background, as the nominal holders of the permit, and make advances to certain native foresters who really work the forests. Under such a system, any improvement of the style of work is, of course, not to be looked for. Disadvantages.

Unless the permit-holder has a disinterested and almost preternatural desire for the public welfare and the future prospects of the forest, his supervision is confined to seeing that the foresters work diligently and get out the largest amount of good timber possible, so that he may be satisfied, both as to the security of his past advances and the propriety of making fresh ones. This, of course, affords him the strongest inducement to be satisfied if timber of any saleable quality is cut; and he is tempted to wink at contraventions of the rules, and to be conveniently blind, if green timber and trees, which form no item of his permit right, are felled to swell the account.

Defects and evils of the permit-holders working by advances.

338. A more abominable system it is not possible to conceive. The native foresters may practise every kind of villainy, as proved in the recent Tonghoo cases, the nominal permit-holder, really or in appearance (for who is to prove his complicity?) remaining in ignorance of what is going on. The temptation to them to get as much timber as possible is irresistible, and they desire no less to get it quickly; hence the rule about two years' seasoning in the permit is disregarded.

Trees are deeply cut into by processes of girdling known as "thung-joung-douk" and "pazoong-hnyatt."* In order to make them dry very rapidly, devices of ripping off the bark either in great pieces when perfectly fresh, or in slices when a little dry,† firing the logs and placing them on slopes in exposed places, are resorted to, and a general disregard for the forest rules results.

Method of illegal working.

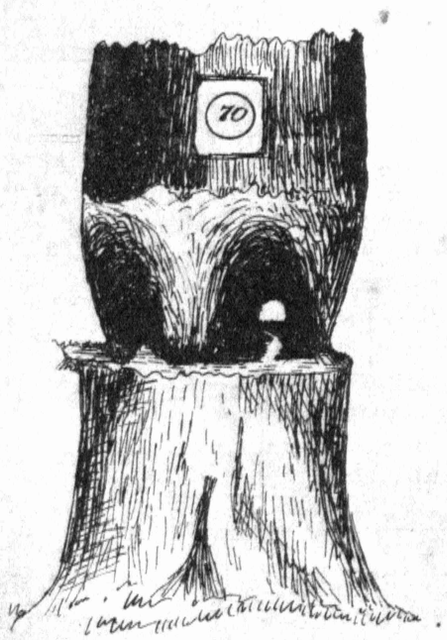
Detection of illicit timber.

339. These processes are not indeed difficult to detect, but the forester can, if he is disposed, render detection difficult by various devices; and in all cases he raises all sorts of excuses, and the matter is rarely settled without a case in court. The Burma Company, a large quantity of whose timber was seized as unmistakably green, raised the plea that it was impossible really to tell green timber, especially after it had been floated; and that if timber would float at all, that was enough to prove it of two years' seasoning! Now if such a plea were really valid, it is obvious that the whole theory of Government is wrong; since the one object of requiring trees to be girdled by the Forest Department and then to stand "more than two years," is to prevent other timber being illegally removed, since such timber as has been felled green, or felled after a short period of girdling only, can be detected by its different appearance. Absurd, however, as the plea is, and ultimately overruled by the courts, it nevertheless entails the production of a mass of evidence, causes prolonged contests in court, and all sorts of interruptions to forest officers in their legitimate duties, as a necessary consequence.

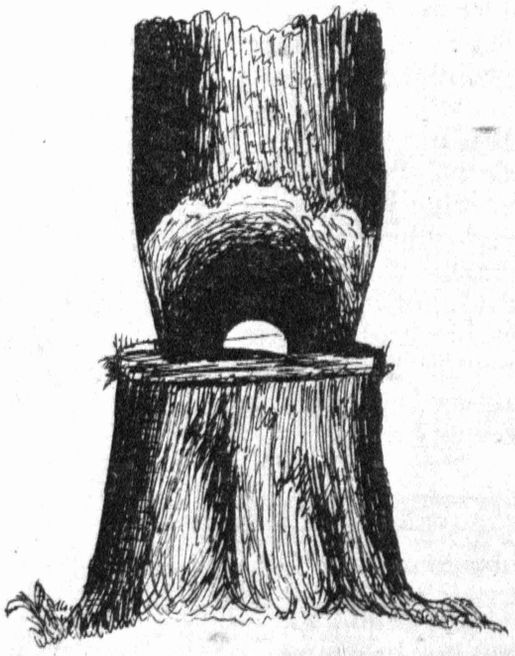
Waste of material.

340. The waste of the material under the permit system is very considerable. The forester, working with the one object of realizing the largest sale

* In the former, three deep cuts are made into the tree and three holes bored in the centre of each cut face, so that the tree merely remains standing on three points. The word means the "support of three pillars." Pazoong hnyatt is a modified form of the same, two cuts only being made and a hole through the middle, thus giving the forked appearance of the "craw-fish claw," which is the meaning of the word. Natchoung douk is a similar process.



"Thung-joung-douk"



"Pazoong-hnyatt"

† This can be detected by the appearance of the log. Where rings cut with a dah appear at intervals down the length of the log, this shows that the bark has been clean removed by lengths. Where the log shows dah-cuts or marks of slicing along its length, the other plan of removal is indicated.

proceeds, will abandon every piece, although really useful, if he does not think his "Company" will accept it or get the best price for it. The dragging parties also eagerly enquire the minimum length that they may hope to get accepted, and they (as it is their interest to have the lightest weight to move) deliver exactly the minimum and no more. These dragging men, in fact, are offered so much for every log *not under* thirty feet, and no increase is allowed for longer length. Now as every foot in length increases the weight and the trouble of dragging, longer lengths are rarely delivered, and fine pieces are unhesitatingly cut up; a handsome butt end, or a long top piece being thus left to waste. This is no mere fancy of the reporter's; the waste actually witnessed in the Burma Company's forests on the Sittang is simply shocking.

Temptation to change—leaving the Government trees and girdling new ones.

341. On the same grounds, the forester has an additional temptation to illegal felling, for if the Government girdling has left him with numerous trees of large girth, to drag which would be expensive, and indeed if all the trees are not just the shape and size that suit his interests best, he is tempted to girdle or fell other trees which do suit him. In the Sittang forests not a few trees of 5′ 6″ and even 4′ 10″ and 4′ 6″ in girth have been felled, just large enough in fact to pass muster, if otherwise good, sound and straight.*

The grievances of the working foresters.

342. Nor are the grievances of the forester quite beyond the notice of Government. They make their contracts it is true, and are not obliged to take advances unless they like; but they complain—with how much truth I cannot of course say—that they are not fairly dealt with; they send down timber and know nothing of what it realizes, having neither voice nor means of control in the matter. When they are informed of the proceeds, it is often to find that what with interest at 24 to 36 per cent. (turned periodically into principal), commission, godown-hire, and a host of other expenses, the balance in their favor is nothing or next to it.

Conclusion regarding the old permit system.

343. It may be certainly concluded that even with honest permit-holders the advantage to the State is very small; and in case of permit-holders who are grasping or dishonest the risk is enormous, especially when the Government establishment is not very strong or the supervising officers first rate men as regards experience and trustworthiness.

Sittang forest are however, exceptionally bad.

344. I do not mean for one moment to suppose that the gross irregularities in the Sittang forests are solely the result of the system. Without active connivance, and most unblushing mendacity and dishonesty on the part of Mr. Graham, the late Deputy Conservator of that division, such practices would not have been possible, but the *tendency* of the system is illustrated, since if such evils are consummated to the full under a bad man, they will be enacted under an indifferent man, and will be liable to be attempted even under a good officer. At any rate the system demands as close a supervision and as strong an establishment as if Government worked the forests direct.

But tendency of the system is a bad one.

And requires so strong a supervising staff as to afford no relief to the Government.

Speculation element in the permits.

345. One other point has to be noticed, the permits are *bid* for by parties intending to work. A notice is issued (about which I shall have to speak presently); in this tenders are invited, the number of trees girdled in the forest and other particulars may or may not be entered, and parties are referred to the forest office for full information. There is, therefore, a strong and undesirable element of speculation in the transaction, which urges a permit-holder who has bid higher than the real resources of the forest warranted to recoup himself by stealing timber. He has, moreover, the whole duty of searching for the girdled trees: he is told that so many trees are supposed to be there, but no special number is guaranteed. He is then let into a large forest tract to find out the trees as he best may.

Searching for the prepared trees.

The present form of permit considered.

346. So much for the system. A few words must be added about the form of agreement or permit, which is in fact the code regulating the operations of the system, and which has been tried to the utmost by the Burma Company in endeavouring to evade responsibility for the acts of their native foresters, and to prevent the consequent loss of the timber illegally obtained by them.

Its history.

347. The form hitherto in use was drawn up by the late Government Advocate, Mr. Macleod; a former Recorder gave some assistance in it, and it

* I have heard it complained that the forester cuts these trees, and the dragging parties seeing them cut, drag them, but when brought to the camp, the forester refuses to pay for them as they are under size! He puts them all the same into the water, and of course takes the benefit of what they sell for.

was finally passed by the Advocate General, Calcutta. As a specimen of legal drafting it is very faulty.*

Defects in the substance of the permit.

348. Apart from defects of wording only, which in many instances lead to serious disputes, the provisions of the permit itself are bad.

The points chiefly raised have been—

(1).—The fixing two years as the period. It has been earnestly contended that the appearance, state of dryness, degree of separation of bark, &c., at the end of two years, are not such as to afford certain indications. It was over and over again contended that a log found with moist bark completely and rigidly adhering might be a two years girdled tree, but grown in a moist locality, &c. &c. Fortunately the timber in all the Burma Company's cases had other circumstances connected with it so that this point failed; but three years is a safer limit, as questions of this sort *could* not then be raised.

(2).—The permit gives the right to all girdled, dead, or fallen trees that have been fully two years dead; says nothing about their being Government-girdled or other; so that permit-holders are unquestionably entitled to take any trees that are two years killed, however unlawfully girdled, provided *they* were no party to the girdling (*e. g.*, where it was done in the previous permit-holders time.)

(3).—The boundaries are rarely stated with anything like sufficient care or accuracy.

(4).—The provision in clause IV about the property of Government in the logs is unintelligible when taken in connection with the permission to put on a mark (of course indicative of property or of nothing) in clause III. Supposing some *wrong*-doer stole the logs so marked in the forest; would the permit-holder have no right of action for recovery? By the permit they are not his property.

(5).—The term "expiry" has been hotly disputed about in clause V; does the term mean expiry by lapse of time only? The point is really unimportant, but much has been made of it.

(6).—The last part of clause VI is simply abominable; the forest rules, which are just as good law as the Penal Code, have to be obeyed whether they are agreed to or not; it is no matter of contract that they bind. If quoted at all, why not give all the rules, and the Penal Code besides, and every other law that may bear on the subject.

(7).—A small volume folio might be compiled out of the papers that have been written about cancelment of the permit under clause XI, and the meaning of the Conservator's "judgment."

(8).—Lastly, although the damage to the forest by way of loss of reproductive power of trees in case of illicit felling is enormous, and the difficulty of assessing the damages in money obvious, no scale of liquidated damages per tree illicitly felled is laid down, although such a contract is just the very sort of case where liquidated damages would, under English law (to say nothing of Act IX of 1872), be most clearly awarded.

The notice inviting tenders should be drawn up with care.

349. I have also to point out that the notice or call for tenders should be worded with no less attention than the permit itself. Great care should be taken that an extract of the *working plan* relating to the forest, and the rules of

* Is the document a lease, or what? In the heading it is called "form of agreement"; in clause 1 it is "agreement;" in 5 it is "lease," in 6,9,10,11 it is again "an agreement;" and in 7 it is a "contract." No minimum length of timber is anywhere laid down, so clause 2 is unintelligible: what is a short length? (unless there is an assumed custom of trade.) In clause 6 the covenant of the permit-holder "not to allow any one" to cut or girdle green teak trees is meaningless. Perhaps it means "use all reasonable efforts to prevent;" if so, why not say it.

There is a strange confusion about the permit-holder covenanting for the "*people* in his employ," called "*men* employed by him" in clause 7, and "*persons* in his employ" in clause 2. What may be the difference between "place" and "locality" in clause 7, and is a "subordinate" not an "officer?" Who and what functionary is meant in clause 8, by "the officer in charge of the said forest?" the Goungwai according to the rules, but this is not intended?

The wording of clause 11 is so involved that it would drive any number of Lincolns Inn Chambers into fits: the clause about spirit and intent is especially bad: it is always interpreted to mean the spirit, *not* the letter, where the intention was that the permit-holder should not only stick to the letter of his contract, but obey it in a liberal sense, so as fully to carry out the main object, *viz.*, that of preserving the forest committed to his charge.

The contract is made by the Chief Commissioner on behalf of Secretary of State, but is signed by the Conservator of Forests without any indication of delegated authority to sign. There are several other errors, but these will suffice.

girdling, should be available for the permit-holder (if these extracts were terms of the agreement under clause VI there would be some sense in it).* Great care should be taken in case a girdling is to take place in such a time that the trees will become available to the permit-holder, to warn him that he is entitled, nay bound, to see after the girdling himself, and cannot object afterwards if he finds the trees girdled not to his liking. And in the case of trees girdled *before* the permit, a most distinct warning should be given that the Government give no guarantee whatever as to either number or quality, but invite intending bidders to go and see for themselves.

No guarantee of any number of trees.

The prohibition of any sub-letting, not merely a formal sub-letting, but anything that in practice virtually amounts to or has the same effect, should be clearly stated. The Burma Company always *practically* sub-let their forests, *e. g.*, Mirza Mahomed Ali in the Myolha actually mortgaged the forest back to the Burma Company as security for advances; now if it had not been virtually made over to him in the first instance, how could he mortgage it back as security?

Sub-letting prohibited.

350. Then again these permits are issued in English, whether the permit-holder understands that language or not. Translations should be signed as counterparts in such cases.

Language in which the permit is drafted.

351. The permits are not stamped; and without pronouncing a definite opinion under Act XVIII of 1869 (the General Stamp Act), I consider it very doubtful whether they ought not to be. As far as Government is concerned, the permit is simply a sale of a quantity of dead timber standing ready to be felled, but not yet felled, and including a few fallen trees that are so far "moveable property." Part of the price is to be paid beforehand, and part on extraction of the timber, and a lien is given on the timber for payment. As far as Government is concerned, it requires no stamp; but on the other hand, the permit-holder agrees to pay a sum of money for the timber, the total amount of which is uncertain, as dependent on the number and size of the logs he extracts. Does such an agreement not require a stamp on *his* part? And if a clause were entered agreeing to pay liquidated damages at so much per tree illicitly felled, would not an optional stamp be required for any amount likely to be required on the contingent agreement to pay? But it is not my duty to offer an opinion; I merely suggest the questions.

Should the permits be stamped?

352. 'Transfers' of permits has been hitherto permitted by a mere endorsement on the margin, and that often not signed by the Conservator even: the permit distinctly requires the written authority of the Conservator for every such transaction. In future this should be strictly regarded, or the transferree may raise questions about his liability.

Transfers of the permits.

353. Lastly, I have to object to the way in which the bare *names of companies* are entered as one of the contracting parties; how can you agree with "the Burma Company, Limited", whatever that may be, and who signs for the company and by what right? proper legal advice should be taken on these points. All sorts of questions about corporations, partnerships, secretaries, and common seals, necessarily unknown to forest officers, may be involved.

Names of companies entered as contracting parties.

354. Now the following alternatives in the system are—

Alternative systems possible in supersession of the present one.

(*a*)—To retain the present system, but removing all the legal uncertainties and defects both of wording and substance in the permit form, making three years the period of seasoning; limiting the permit to smaller and more definite forest blocks; and above all defining the *maximum number of logs which may be extracted under the permit.*

This latter, which is the *only* condition on which these sort of permits ever will really succeed, involves a minute examination of the forest by defined blocks, so as to know really the number of girdled trees, "náthát", or naturally dead trees, and "aulay", or blown down trees, and then enable (on a calculation of so many logs of not less than 18 feet to a tree) a liberal maximum of logs to be fixed for each block.†

Objection to retaining the present system even with all legal defects removed.

This being known, the notice for tenders would specify the maximum, but carefully warning the public that, while Government do their best to secure

* It will be observed that I have provided for the matter in new draft rules. *Vide* section 4, *ante*.

† The logs being calculated on the 18 feet basis, or rather partly on 30 feet and partly on 18, as the custom of the trade would most generally warrant, persons requiring to cut up short logs (say for sleeper contracts), and so increase the number, must get a special permission.

accuracy, they cannot *guarantee* any particular number. I would abandon pre-payment and take the *whole* price at the revenue station.

At the close of each permit, a season should elapse to enable an inspection to be made for girdling more trees, and for determining the stock left over by the last holder; during that year petty contracts might be given out for removing and utilizing such top pieces, second class timber and even logs cut and lying which the permit-holder could not or would not remove.

Such a system of course necessitates the retention of girdling by Government.

A system of permit to remove trees *marked* by Government.

He might then girdle or fell green as he pleased.

Objections.

355 (*b*).—The next system would be to issue permits for the removal of all trees *marked* by Government also in very accurately demarcated blocks, leaving it to the permit-holder to show the Government hammer on every stump after the felling is completed, but allowing him to cut the trees at once or girdle them, *whichever he pleased;* and this would be the best way to decide the question *pro* and *con* girdling. But this plan would require an extreme care in marking the trees in the first instance, a careful examination afterwards, and would open the door to fraud, as stumps might be manipulated with but little trouble to look like very old burned stumps of a date before the system began.

Third system recommended: a division of the forest and all first class trees to be removed in it.

356 (*c*).—The third system would be the one I have recommended in the chapter on the working plan, is to divide the whole of the teak-bearing area, excluding all portions intended for special reserves, into blocks or divisions containing about an equal *number* of first class trees, irrespective of *area*, and opening one after the other for the removal of *all* first class trees. The divisions would be worked in order according as we wanted to get clear of teak, and give up the forest to district use in a densely populated place, and according to other circumstances; and would, in all cases, absolutely *exclude* the area intended to be kept as special reserve.*

Safeguard in working, a very simple one.

357. The permit would absolutely prohibit passing at a revenue station logs below a certain minimum girth at the butt end, provided always that top pieces might be passed at the owner's sole responsibility to take such steps as to marking, &c., that there will be no uncertainty or incompleteness in the proof that they *are* such top pieces and not small trees illegally felled. If the permit-holder cannot or will not consent to take the precaution required, he must consent to give up the pieces, that is all. In case Government should wish to save a few first class trees in the forest block, the reserved trees only would have to be clearly marked, and the permit-holder made answerable for not cutting them.

358. The fact of the permit system proving a failure in a money point of view and being fraught with difficulties in management, will probably raise a determination that it shall close absolutely. While myself inclining rather to the Government working, *provided that other and more important forest work is not allowed to be postponed to it, and provided the above plan of exploitation is adhered to,* it is my duty to state clearly the arguments *for* such a permit system, as well as those against it.

359. It will be readily admitted that a permit system which would relieve Government of all the responsibilities attending the extraction of timber, and the cost of the establishment for effecting or supervising it, would be a boon. Now if such a system can be safely devised, the determination to reject absolutely the idea of continuing *any form* of permit system has at least a *primâ facie* objection to it.

Complaint of the poor results attained by the Forest Department.

360. It is complained that the Forest Department is a mere "timber shop." This is to some extent true; but its causes are two: one because of ignorant and inferior employés (*anybody* was good enough in former days for a forest officer), who knew neither the principles nor the practice of forest treatment, and so turned to girdling and timber floating; the other, that the officers had not possibly time to do both works thoroughly.

Question to be plainly answered.

361. Before, therefore, the authorities finally decide that they will work out timber entirely by Government agency or by a permit system which requires great attention on the part of the forest staff, I ask them to answer definitely this plain question.

Will you give establishment enough to do both works efficiently, or will you consent to have one or other work neglected?

* For if timber *must* be extracted at once from these, it must be done by Government agencies.

362. Now the advantages of the system I have proposed have already been in a great measure discussed, but briefly recapitulated, they are— Advantages of the proposed system. Easy control.

(1).—The permit will be simple and very easily controlled, and disputes are almost impossible, since no question about bark, floating green or dry timber arises; the girth is the one and only test, and the proviso about top pieces perfectly easy of application.

(2).—Even if a few trees are illicitly felled we shall not care so much; in other words we have not the extreme anxiety about the forest future we have in other cases, because the block opened is in all probability either going to be given up altogether, or given up after the felling is over to be an ordinary reserve, in which it is only of secondary importance that *teak* as a species should be reproduced. Absence of danger to the forests.

(3).—It will enable the establishment to devote their whole energy to forest work, and only require a very inconsiderable addition to enable the teak exploitation work to be supervised. Establishment can be devoted to real improvement works.

(4).—Because if Government does the work, *we* shall have the responsibility of determining whether we will girdle the trees or not, and if we fell them *green* we shall have the risk of them being injured, &c., while lying in the air sufficiently long to make them float. This risk in the case of a permit-holder will fall on him who has better means to sustain it, for we have no sufficient establishment.

363. If, after considering these points, it is determined to work by Government (excepting in the case of certain forests like the Upper Salween, Mhinegelay, Meebong and Hhlineboay, which may be leased) then, *exactly the same* division and exploitation of trees has to be made; only by contract, instead of by permit-holders; and officers in the special works division, not in the forest divisions, must supervise it. If still objected to, then work for the timber supply *in the same way*, only cut the trees by Government instead of by permit-holders.

364. Lastly, I give two forms of permit. It depends, of course, on the opinion of the legal advisers of Government whether it is necessary to throw this matter into proper conveyancing form, or whether under the law administered in British Burma,* it is sufficient to draw it up as a mere agreement, in which case the agreement itself might contain only the general clauses,—the permission to cut teak timber "as provided in the conditions annexed," and the consideration, the term of duration, the power of cancelment, and the clause for liquidated damages. The rest of the specific conditions as to place and rates of payment, &c., might follow in a schedule annexed to the agreement. I have shown the drafts to the Government Advocate, who, after consideration, says that "the form of permit meets every requirement of the case, but requires to be put into a more legal form, though this being a matter of detail, might be done after the clauses in it had received sanction of the authorities." My drafts are made in the form of *instructions to a conveyancer*, and will I hope prove sufficient; the first form only shows what the *existing* permit-agreements *ought* to contain. The second form is that I would propose in future to adopt for the clear cutting of the defined compartments if the permit system is adopted at all.

B. H. BADEN-POWELL, B. C. S.,

Offg. Inspector General of Forests.

* What law is administered in the Recorder's Court I never could discover; whether English common law, or equity, or Indian statute law, or a mixture of all three.

FORM No. 1.

AN agreement entered into this day of one thousand between the Conservator of Forests of British Burma on behalf of Her Majesty's Secretary of State for India in Council (hereinafter called the Conservator of Forests) of the one part, and (hereinafter called the permit-holder) of the other part.

1. The Conservator of Forests agrees, in consideration of the payments hereinafter provided to be made by the permit-holder, to allow the said permit-holder to cut up and remove logs from teak trees to be felled by him or already lying in the forest, of such number and descriptions and in such localities as are hereinafter described, the said permission to hold good for a period of three years from the date of this agreement, or until the day of one thousand

2. In this agreement the term "girdled" tree shall be taken to mean a tree girdled according to the forest law for the time being in force, by the proper officer of the Government Forest Department, and which bears the girdling mark of the said department, and which has been completely dead for three full years. A "nathat" tree means a standing tree which has been completely dead (from natural causes) for three full years. An "aulay" tree means a tree which has fallen by natural causes, and which has been completely dead for three full years.

A "log" shall be taken to mean a girdled, nathat, or aulay tree or part of such tree, felled and severed of any girth and (unless otherwise specially agreed) not less than 18 feet in length, but does not include boat hulls or timber hollowed out for any purpose.

3. This agreement gives the right to fell, cut, and remove teak logs of the following number, description, and in the following localities only, that is to say:

In the block
of the forest
bounded on the north by
on the south by
on the east by
on the west by

[*as the case may be.*]

Not exceeding logs from girdled trees.
Not exceeding logs from nathat trees.
Not exceeding logs from "aulay" trees.
Not exceeding logs already cut and lying in the forest [*as the case may be; if the permit applies to more than one block, give the detail of boundaries and the number of logs separately for each block.*]

4. Should the permit-holder wish to cut up any timber into lengths below 18 feet, he must apply to the chief forest officer in charge of the division in which the forest is situate, and such officer may give or withhold permission, as he thinks fit, or may withdraw it after it has been given.

5. Whenever any free grant of timber is made to parties other than the permit-holder from any part of the forest to which this agreement applies, such timber shall be made over to the grantee through the permit-holder, and shall be provided by the Conservator of Forests in such manner as not to diminish or interfere with the quantity of timber available for the permit-holder under this agreement.

6. In the event of any dispute arising as to the boundary of the forest or any subdivision or block of the forest to which this agreement applies, the permit-holder will submit to the decision of the Conservator of Forests as final.

7. The permit-holder agrees to pay to such person as the Conservator of Forests may appoint for the purpose for each log lawfully removed from the forest at the following rates; that is to say:

For logs of, &c.

[*Here specify rates for each sort of log according to length and girth or otherwise; these rates must include everything as no permit fee is taken in advance.*] Such payment shall be made at the forest office on the arrival of the logs at the timber revenue station.

Every log which shall drift past the timber revenue station without having been paid for, shall be the property of Government.

8. The permit-holder shall not (without the permission in writing of the Conservator of Forests) square, saw into scantlings, or otherwise convert, or convey to any other place than the timber revenue station, or sell or otherwise dispose of any log until payment therefor at the rates before agreed on has been duly made, and the Conservator of Forests shall have a lien upon each log until so paid for.

9. The permit-holder agrees that nothing in this agreement shall be held to exempt him, his agents, servants or workmen from liability under any law or rule having the force of law in respect of any offence or illegal omission, contrary to the provision thereof, and he further agrees that he will efficiently supervise the work under this agreement, and that he will immediately report to the chief forest officer in charge of the division, and also to the Conservator of Forests, any infringement or suspected infringement of the law (other than petty offences) which may come to his knowledge.

10. The permit-holder will at all times give all information required by the Conservator of Forests and all other officers of the Government Forest Department regarding the work and the places where any work under this agreement is being or has been carried on by him, and will afford them every reasonable facility for examining such work and such places.

11. The permit-holder further agrees that he will not claim to pay for or pass any timber which may have been felled, cut up, dragged, or floated contrary to law or otherwise than under terms of this agreement, but will give up the same to the Conservator of Forests or chief officer in charge of the division.

12. The permit-holder further agrees that he will not transfer by sale, mortgage, lease, or otherwise any right or rights conveyed to him by this agreement without the permission in writing of the Conservator of Forests. The Conservator of Forests may in any case refuse such permission, and it will be his duty to do so unless he is satisfied that either the transfer does not affect the duties and liabilities of the permit-holder, or that the transferree will by the terms of the transfer undertake the duties and liabilities of the permit-holder under the agreement as completely as if he himself had entered into the agreement in the first instance.

13. The permit-holder further agrees that he will make all necessary and adequate arrangements for the efficient working of the forest, and will commence to work by the and thereafter will continue to work the said forest during the usual working seasons until the determination by lapse of time or otherwise of this agreement.

14. The permit-holder further agrees that whereas the assessment of damages for forest destruction and the loss of reproductive power of trees felled is a matter of great difficulty, he and the Conservator of Forests have determined on and agree to abide by a scale of liquidated damages hereinafter specified to be paid by the said permit-holder in respect of every tree unlawfully felled or destroyed by him or with his consent, or for his benefit direct or indirect, or unlawfully felled or destroyed by his agents, servants, or any other person directly or indirectly under his control; or
with his knowledge after the fact, unless such felling or destruction was reported according to clause 9 of this agreement; or
with or without his knowledge if he failed to use reasonable endeavours to prevent forest offences or efficiently to supervise the work according to clause 9 of this agreement.

The scale of damages agreed on is as follows :—

For every tree unlawfully felled or destroyed as aforesaid—

Not exceeding ten in total number	Rs.	80 each tree.
For every tree exceeding ten, and not exceeding fifty ...	„	100 „
For every tree exceeding fifty and not exceeding one hundred	„	150 „
And for every tree over one hundred...	„	250 „

The cancelment of the permit hereinafter provided for shall not be held to affect the right of the Conservator of Forests to recover damages according to the above scale, provided that in estimating such damages the nett value on the spot of all lawfully felled timber which has not been passed at the timber revenue station, and the value as timber of the remaining trees in the forest available under this agreement, shall be deducted from the amount of damages claimable.

15. The permit-holder further agrees that the Conservator of Forests may, with the sanction of the Chief Commissioner of British Burma, cancel this agreement in respect of all rights and privileges conveyed thereby to the permit-holder if he is satisfied—

(I.)—That the permit-holder has failed to commence work or continue working as provided in clause 13 of this agreement; or—

(II.)—That the permit-holder has himself, or his agents, servants, or workmen have infringed any law or rule having the force of law in respect of the forest to which this agreement applies; or—

(III.)—That the permit-holder has failed to comply with, or has acted contrary to the provisions of clauses 8, 9, 10, 12 of this agreement.

Pending application for the sanction of the Chief Commissioner to the cancelment of the agreement, the Conservator of Forests may, if he think it necessary, stop the work under the agreement until the orders of the Chief Commissioner can be obtained, and no claim for damages in respect of any such stoppage shall be valid.

16. On and after the day on which this agreement expires by lapse of time, cancelment, or otherwise, all right to fell, cut, and remove timber shall cease, and all logs lying in the forests or river above the timber revenue station, and likewise all logs that may be brought to the timber revenue station, shall revert to the Conservator of Forests.

In witness whereof the Conservator of Forests for British Burma, on behalf of Her Majesty's Secretary of State for India in Council, and (if a firm or corporation on behalf of the) have hereto set their hands, the day and year first above mentioned.

Witness }
Witness } (Sd.)

Conservator of Forests, British Burma.

On behalf of Her Majesty's Secretary of State for India in Council.

(Sd.) (Permit-holder's signature.)

FORM No. 2.

Agreement between
hereinafter called the permit-holder, of the one part, and the Conservator of Forests, British Burma, on behalf of Her Majesty's Secretary of State for India in Council, hereinafter called the Conservator of Forests, of the other part.

1. The Conservator of Forests, in consideration of the payments to be made by the permit-holder as hereinafter provided, agrees to allow the said permit-holder to fell teak trees, and to cut up and remove timber obtained from such trees or already lying on the spot, subject to the conditions regarding locality, size of timber, and other matters hereinafter provided for a period of three years, that is to say, from the day of 18 until the day 18 .

2. The *localities* in which teak trees may be felled in virtue of this agreement are as follows, that is to say:

[*Here specify the name of the forest and the exact and carefully and fully described boundaries of the 'block' in which the felling is to take place.*]

Should any doubt or dispute arise as to the boundary of the tract *or tracts* in which felling is allowed in virtue of this agreement, the permit-holder agrees to refer the settlement of the question to the Conservator of Forests and to abide by his decision as final.

3. Within the limits prescribed by the last preceding clause all teak trees may be felled if over 6 feet in girth, when measured at 6 feet from the ground (the height being taken from the highest side of the ground where the tree is standing on a slope or on uneven ground): *Provided* that no tree of such girth shall be felled if it bears the Government mark indicating it to be a 'reserved tree.' The Conservator of Forests will clearly inform the permit-holder of such mark, if any.

4. The permit-holder further agrees that he will not cut up his timber into lengths below 18 feet, unless expressly permitted in writing to do so by the chief forest officer of the division in which the forest is situate; such officer may withdraw any such permission at any time.

5. The permit-holder agrees that he will at his own expense bring down all the timber obtained under this agreement to the timber revenue station, at which place it shall be paid for as hereinafter provided. *Provided* always that no log which has a less girth than 6½ feet measured at the butt end shall be passed or paid for; but the permit-holder agrees that such log shall be deemed conclusively (as between the parties) to have been obtained from a tree under 6 feet in girth at 6 feet from the ground and contrary to this agreement. Pieces whose butt end measures less than 6½ feet in girth shall, however, be passed if proved to the satisfaction of the officer in charge of the timber revenue station to be top pieces belonging to logs of full size. The permit-holder agrees that he is responsible so to mark and bring down such top pieces as to enable him to prove that they are such.

6. The permit-holder further agrees that he will not, without the permission in writing of the Conservator of Forests, saw into scantlings, square, or otherwise convert or convey to any other place than the timber revenue station, or sell or otherwise dispose of any log until payment therefore at the rates before agreed on has been duly made as aforesaid, and the Conservator of Forests shall have a lien on each log until so paid for.

7. Payment shall be made for logs at the rates following, that is to say:

[*Here specify full rates in detail.*]

8. Every log which shall drift past the timber revenue station without having been paid for as aforesaid shall belong to Government, and the permit-holder shall have no claim to the same.

9. The permit-holder agrees that nothing in this agreement shall be held to exempt him, his agents, servants, or workmen from liability under any law or rule having the force of law in respect of any offence or illegal omission contrary to the provisions thereof; and he further agrees that he will efficiently supervise the work under this agreement, and that he will immediately report to the chief forest officer in charge of the division, and also to the Conservator of Forests, any infringement or suspected infringement of the law (other than petty offences) which may come to his knowledge.

10. The permit-holder will at all times give all information required by the Conservator of Forests and all other officers of the Government Forest Department regarding the work and the places where any work under this agreement is being or has been carried on by him, and will afford them every reasonable facility for examining such work and such places.

11. The permit-holder further agrees that he will not transfer by sale, mortgage, lease, or otherwise any right or rights conveyed to him by this agreement without the permission in writing of the Conservator of Forests. The Conservator of Forests may in any case refuse such permission, and it will be his duty to do so, unless he is satisfied that either the transfer does not affect the duties and liabilities of the permit-holder, or that the transferree will, by the terms of the transfer, undertake the duties and liabilities of the permit-holder under the agreement as completely as if he himself had entered into the agreement in the first instance.

12. The permit-holder further agrees that he will make all necessary and adequate arrangements for the efficient working of the forest and will commence to work by the and thereafter will continue to work the said forest during the usual working seasons until the determination by lapse of time or otherwise of this agreement.

13. The permit-holder further agrees that whereas the assessment of damages for forest destruction and the loss of reproductive power of trees felled is a matter of great difficulty, he and the Conservator of Forests have determined on and agree to abide by a scale of liquidated damages hereinafter specified to be paid by the said permit-holder, in respect of every tree unlawfully felled or destroyed by him or with his consent, or for his benefit, direct or indirect, or unlawfully felled or destroyed by his agents, servants, or any other person directly or indirectly under his control, or
with his knowledge after the fact, unless such felling or destruction was reported according to clause 9 of this agreement, or
with or without his knowledge if he failed to use reasonable endeavours to prevent forest offences or efficiently to supervise the work according to clause 9 of this agreement.

The scale of damages agreed on is as follows:—

For every tree unlawfully felled or destroyed as aforesaid:—

Not exceeding ten in total number	Rs. 80	each tree.
For every tree exceeding ten and not exceeding fifty ...	„ 100	„
For every tree exceeding fifty and not exceeding one hundred	„ 150	„
For every tree over one hundred	„ 250	„

The cancelment of the permit hereinafter provided for shall not be held to affect the right of the Conservator of Forests to recover damages according to the above scale, provided that in estimating such damages the nett value on the spot of all lawfully felled timber which has not been passed at the timber revenue station, and the value as timber of the remaining trees in the forest available for felling under this agreement, shall be deducted for the amount of damages claimable.

14.—The permit-holder further agrees that the Conservator of Forests may, with the sanction of the Chief Commissioner of British Burma, cancel this agreement in respect of all rights and privileges conveyed hereby to the permit-holder if he is satisfied—

(1.)—That the permit-holder has failed to commence work or continue working as provided in clause 14 of this agreement, or

(2.)—That the permit-holder has himself, or his agents, servants, or workmen have infringed any law, or rule having the force of law, in respect of the forest to which this agreement applies, or

(3.)—That the permit-holder has failed to comply with, or has acted contrary to, the provisions of clauses 8, 9, 10, 11 and 12 of this agreement.

Pending application for the sanction of the Chief Commissioner to the cancelment of the agreement, the Conservator of Forests may, if he think it necessary, stop the work under the agreement until the orders of the Chief Commissioner can be obtained, and no claim for damages in respect of any such stoppage shall be valid.

15. On and after the day on which this agreement expires by lapse of time, cancelment, or otherwise, all right to fell, cut, and remove timber shall cease, and all logs lying in the forests or river above the timber revenue station; and likewise all logs that may be brought to the timber revenue station shall revert to the Conservator of Forests.

In witness whereof the Conservator of Forests for British Burma, on behalf of Her Majesty's Secretary of State for India in Council, and
(if a firm or corporation on behalf of the
have hereto set their hands, the day and the year first above mentioned.

Witness } (Sd.)
Witness } *Conservator of Forests, British Burma.*

On behalf of Her Majesty's Secretary of State for India in Council.

(Sd.) (Permit-holder's signature.)

APPENDIX A.

No. A 3.

From

B. H. BADEN POWELL, Esquire,

Offg. Inspector General of Forests.

To

Colonel W. S. OLIPHANT, R E.,

Secretary to the Government of British Burma.

P. W. D.

Rangoon July 12th 1873.

Sir,

Referring to your letter in the Department P. Works No. 1749-79 F dated 23d June, 1873, I have the honor to inform you that I proceeded with Capt. Seaton, Conservator of Forests to Thayetmyo, and met Colonel Horace Browne, Deputy Commissioner of Thayetmyo, and arranged with him regarding the Cutch (*acacia catechu*) reserves in Thayetmyo district both East and West of the Irrawaddie, and took the opportunity also of discussing the question of teak reserves about which I send a separate letter.

Brief review of previous papers.

2. It will be convenient to review very briefly the previous history of the case.

3. The correspondence opens with a note by Mr. Leeds, then Conservator of Forests, on the subject of Cutch.

It appeprs that the chief seats of the Cutch boiling are in the districts of Thayetmyo and Prome; there is also Cutch in Myanoung; some in Bassein, and a little in Rangoon. Of Tenasserim nothing is said. Mr. Leed's estimate of 20 years for a tree to reach maturity is unquestionably too low.

This report was sent to the Government of India and directed to be printed in the Gazette.

4. The Commissioner of Pegu then sent up a report by Colonel Browne, suggesting the conservancy of Cutch; this is the really important paper in the series (December, 1870.) This was sent to the Conservator of Forests who in a letter dated 26th October, 1871, agreed in the need of conservancy, and gave reasons explaining his inability then and there to propose measures of conservancy. The Conservator pointed out, that it would be no use trying to conserve *trees* of Cutch, but that *tracts* of Cutch forest should be reserved and placed under teatment.

5. The Chief Commissioner on perusal of this letter (Proceedings November 1871) directed that the Cutch tracts should be examined with a view to reservation. Captain Seaton's letter was at the same time sent to Colonel Browne who concurred in the views, and explained that he did not consider that the teak rules, should be extended in all their attempted strictness to the Cutch tree; Cutch boiling should be placed under suitable restraint and the waste of so valuable a tree by cutting it for fuel should be prohibited.

6. The Conservator of Forests in his No. 737-11 C. dated 6th November 1872, sent in a report as to what had been done; no definite proposals for Cutch tracts, however, were submitted.

The Chief Commissioner's orders remarked on this and asked for definite proposals.

These letters are now without interest as they throw no light on the subject.

7. The Conservator of Forests in his No. 347-2 of 5 June 1873, then sent up the local Forest Officer's report and commented on the proposals. This report is important. Its results were, that as regards the Forests East of the Irrawaddie in Thayetmyo and Prome districts, certain definite tracts were proposed: 4 of them in Thayetmyo contained 49 square miles, and 3 in Prome contained 35.75 square miles. No proposals were made for the Western forests, as it is said that the whole place is destroyed and all tracts cut up.

8. It was pursuant to this report, that the letter first alluded to was sent to me.

9. As is invariably the case when the Forest work commences with a cordial understanding between the District and Forest Officers, we found no difficulty whatever in arranging terms as definite and as satisfactory as the conflicting interests of a growing population, demanding area for cultivation, and those of close conservancy, permit.

10. In the first place we started with an understanding that our work must be to reserve *tracts* of country and treat them effectually, and that no system of dealing with trees as individual species would be of use: this proposition is now generally agreed to, and is so totally incontrovertible in a forest point of view, that I think I need hardly enlarge on it.

Preliminary Reservation by *tracts* not *trees*.

11. In the next place it was observed that the tracts should be fixed whether still in good condition or not: for, even, if though a tract were ruined, still if it was a natural cutch producing soil and locality, it could be without difficulty restored and planted up again; on this ground our proposals were both for the East forests and those in the West reported as destroyed already.

Tracts taken up whether stocked or cut out.

12. In the third place it was agreed that the reserved Cutch tracts must be in places where there was a suitable access and export line and that they must be treated as close or special Reserves as most of them would be under coppice with tender shoots, others being planted up by sowing and even those that were being worked should not be interfered with in any way that would diminish the stock of material available for the Cutch boilers who would have paid for the right of working in the compartments open for the purpose. This in fact necessitates the full exercise of careful conservancy, the exclusion of fires, the prohibition of toungyas, in short all the conditions of a special reserve. Now as such conditions have to be imposed only when they will not unduly clash with the interest of *bona fide* cultivating settlers (and not mere Cutch squatters, who we agreed were not entitled to such consideration), *the tracts have been in all cases proposed in places where the conservancy will not press on the people.*

Export line.

Close conservancy a *sine qua non*.

Right and convenience of neighbors considered.

13. Some of the tracts, however, are not to be marked off till further information has been obtained in the case of the *Western Reserves*, as Colonel H. Browne had no previous definite proposals before him for these, and therefore had not visited the places we specially enquired into, the subject west of the Irrawaddy.

In some cases a final examination still necessary.

14. Starting then with these preliminaries I have now only briefly to deal with the following points.

I. The area and position of these tracts both East and West in the Thayetmyo district.

II. The legal position, as regards the right to reserve ; the forest rules, etc.

III. The principles of treatment to the tracts themselves and of the rest of the Cutch scattered in various parts of the district in relation to the special reserves,

IV. What remains to be done in other districts.

I. The position of the tracts reserved.

15. The accompanying maps shewing East and West Thayetmyo show the proposed Cutch tracts in *pink;* the *green* lines indicate the teak reserves, which as before said, I deal with in a separate letter.

The reserved tracts.

16. In the Eastern Thayetmyo the following tracts are proposed.

Eastern.

		Estimated area in square miles.
1.	The Upper Satsoowah special Reserve ...	6.5
2.	The Lower do do ...	3.5
3.	The Bangong do do ...	4.0
4.	The Tendaw do do ...	4.5
5.	The Thabyee-hla do do ...	12.5

17. The Western tracts (subject to a final examination but dealt with on the best information at hand, as being in all probability available) are :

Western.

		square miles
1.	The South Maday Special Reserve ...	30.0
	(Near the Yoma Teak) do ...	
2.	The Khyeeba-kyaw do do ...	22.5
	(Near the Irrawaddy river)	

These West tracts are of very satisfactory size, but are still so large that they *can* be reduced in favor of any particular village or villages which the final examination may render it necessary to provide for.

18. The boundaries of these tracts are stated in a note (Appendix A) taken down by Captain Seaton as we went over the maps in conference.

Appendix A.

II. The legal question.

19. As to the legal aspect of the question, the special Reserves as constituted will exactly suit the new rules which will be shortly submitted, and as I have every hope, from the extremely favorable way in which these rules have been received by every one to whom I have shewn them for preliminary advice, that the Chief Commissioner will be satisfied with them on the whole ; there will be only a short time before all questions about the reserves both East and West will be at rest as far as the legal power to reserve is concerned.

20. At present, the Eastern tracts are under the Forest Rules under Act VII of 1865; the Western tracts are not : but the western forests are not the less the property of Government.

The legal position of the Western forests.

The Government deals with those forests as its own, has publicly claimed them ever since 26th September 1853* and leased out the teak forests ; if any community or private individual had had a general claim over-riding that of Government, we ought to have heard of it before now.

* It is perfectly immaterial how or under what authority Government issued that notice. The state by it put forward an adverse claim to a right, and took possession accordingly—that possession has been undisturbed and no one has disputed it.

21. If therefore Government makes an order that it chooses to close and hold for purposes of plantation these tracts of unappropriated waste and jungle lands—for such they are, Government has a perfect right to do so; and it can punish under the ordinary law an infringement of its right of property; though it can not enforce the special rules of Act VII.

Effect of Act VII. of 1865.

22. It is important to remember, that Act VII. of 1865, creates no property; it cannot make anything a Government forest that is not already the property—absolute or limited—of the State. It simply empowers a notification (which is specifically interdicted from affecting any rights whatever) to be made, and thereon certain rules are added over and above the ordinary penal laws for the protection of the notified tracts. Hence the mere fact that the Western forests have not been declared under the Act does not alter the proprietary right in them in the slightest degree, one way or the other. Practically all that is wanted is a setting apart of certain tracts of Government jungle land for the purposes of Cutch rearing, by order of the Executive Government.

Additional prohibitions agreed on.

23. But then it is contemplated besides setting apart certain tracts in this way, to adopt the valuable suggestion of Colonel Horace Browne and prohibit *generally* the use of Cutch trees out side the reserves for fuel, and to demand that all persons boiling Cutch in the district outside the reserved tracts should do so by *permit* issued by the District Officer subject to the payment of a small fee.

These features are essential concomitants of the Reserve System, though in so saying I am forestalling the remarks to be presently made on the treatment of the Cutch Forest.

Power to enforce these prohibitions.

24. I think again that as there are certainly no private rights in the Cutch trees, Government can by a mere order on the executive side, warn people that they must get permits and pay fees before setting to work at Cutch boiling,—and that they must not use Cutch as fuel.

And people who destroyed these trees in these ways would be punishable for "mischief" if not for misappropriation of property. However this may be, I believe that the Deputy Commissioner's order thoroughly well made known would be readily obeyed, and would at least serve as a protection against waste till either the whole of the Western Forests are notified under Act VII. as subject to the present rules; or, far better, till a revised notification can be published for the whole, a proceeding about which I cannot foresee any cause of delay.

25. As regards the Eastern Forests which are already notified under Act VII., 1865, the Special Reserves can be declared under Rule 13, the general prohibitions by an order under Rule 12. (Rules 12 and 11 respectively, of the "Handbook.")

III.—The Treatment of the Cutch Tracts.

2 kinds of Catechu trees.

26. It is well known that all trees of A. Catechu do not, at any rate in Burma, yield Catechu for commerce. Certain trees give a juice which the people say will not coagulate. They look at the tree, cut into it slightly, and note by the peculiar color and mottled appearance whether the wood is of the right kind. Trees that will not do for Cutch are nevertheless good as timber. Care will have to be taken that such trees do not preponderate in the reserves, and that they are cut and not kept as seed trees.

Size of tree unsuitable for Cutch boiling.

27. The size of tree preferred for Cutch boiling is not less than two cubits girth (3 feet), though from the scarcity of the tree, smaller trees may be used. Even very large and old trees yield excellent Cutch. As, however, we need a quick return, it will not be either wise or profit-

able to treat the tracts on a very long rotation. In my opinion the treatment should be for coppice with a limited number of standard trees left judiciously distributed here and there. These will from their light foliage, do no harm, and of course, straight, sound, tall trees, with a regular but not too spreading crown will be reserved as the standard; they will help the coppice reproduction by their seed.

"Coppice with standard" treatment recommended.

28. A rotation of 30 or 35 years will, judging from the results of Mr. Elsner's ring countings, prove sufficient.

Length of rotation.

29. It has to be carefully borne in mind that we do not know yet whether the Acacia Catechu reproduces from the stool only, or from the roots as well. Trees which reproduce from both will coppice up to a late period of life, while those which reproduce from the stool, above ground, will only coppice when they are cut in the earlier years.

Power of Coppicing.

30. It may be found, therefore, that some of the Cutch trees will not coppice any more or do so feebly; in that case and the filling up of blanks in all cases has to be done by *seed.*

I do not think that the *Acacia* will stand transplanting without great care, and for large operations to be done cheap, the seed should be dibbled lightly into the loosened soil *in situ.*

Reproduction treatment.

31. It must be remembered that the *season* of cutting down a tree influences its coppicing greatly. It should be done in Spring, just when the sap is recovering its active circulation and buds are forming. How far the exigencies of the manufacture will admit of such a precaution I am not aware, but the subject should be borne in mind.

Season of cutting.

The trees cut down must be so close to the ground, and slightly slanting, to

enable rain-water to run off and not collect and rot the stool. The top to be clear cut, not jagged and with bits of bark and wood torn down.*

32. This must be insisted on, and also the immediate removal of the cut material from the compartment on to the export roads, and thence as quickly as possible to the place set apart for boiling the Cutch.

33. The whole of the Cutch reserves will be efficiently demarcated and fire-traced with good broad lines. (I am convinced those in use in Burma generally are too narrow by half.) The conditions of soil and growth are so similar that the whole area can be practically treated on the same basis: and when it is recollected that we have only rough and ready means at disposal, this will be hardly objected to. I would divide each block into a sufficient number of compartments (divided by rectilinear cleared paths, which will serve as export roads) to allow for the whole rotation. Or if the blocks are not large enough, combine two or more blocks in one rotation. Again, if they are very large, make one reserve into two, three or four blocks.

Division into Blocks and Compartments.

Area treated as uniform in condition.

* I may mention for the sake of readers not familiar with coppicing, that the reason why "Toungyâs" exterminate Cutch, and could not be allowed in the reserves is, that the trees are not only cut back and hacked down any how,—but the stool is also *burnt* heavily in the clearing.

34. It is impossible to limit by rule of thumb, the size of the compartments but here as we are for reasons above stated fixing the compartments arbitrarily, on an assumed equality of conditions, the convenience of size for protection is all I consider in this preliminary idea of the treatment, and certainly 100 to 150 acres at the outside is sufficient.

Size of the compartments.

35. The compartments should be numbered and at once noted off, and the numbers which contain a sufficiency of mature trees to enable them to be worked—those which are recovering and those which are blank. A scheme must be drawn up shewing the order in which it is proposed to cultivate and restore these compartments.

Order of working.

36. In cutting for coppice it is less material whether all the trees at the first period of exploitation are of uniform age. The compartments will of course be treated by "clear felling."—Every thing except the reserved trees, and young saplings being clear cut. The compartments will then be closed and watched carefully, reproduction assisted as experience may decide.

37. One other point remains, and that is an important one, until the Cutch reserves are capable of being worked on system, the Deputy Commissioner agrees that he is prepared to prohibit all Cutch being cut for fuel, and that he will issue notices etc for the next Cutch season, that the Cutch boilers must obtain permits from him, and he will *refuse permits* in the 'Special Reserved Tracts' which are undergoing the preliminaries of demarcation, fire-tracing, compartment forming etc. The permits will prohibit felling Cutch of less girth than 3 feet, at 1 foot from the ground.

Proposed action with regard to Cutch throughout the district.

IV.—The work in other Districts.

38. We had a preliminary talk with the Deputy Commissioner of Prome, and found to our dismay that the whole of the papers had been left over untouched by the last Deputy Commissioner. It will be necessary for a visit to be paid to Prome, and the same sort of scheme settled for that district, also for Myanoung. In Rangoon the Cutch is not important enough to demand a separate treatment, but such tracts as exist, as those near the Hline river, will probably fall into one or other of the General Forest Reserves, and thus get protected.

Cutch in other districts.

39. In Bassein also Cutch tracts may be reserved: and it is certain that on the assumption of the charge of the Western Forest, an additional western division or subdivision will have to be constituted. Such tracts can be provided for.

40. There is no object in growing Cutch in Tenasserim.

41. I consider that it will be a good plan (and this I have suggested in my General Report) to place the Cutch tracts of Prome and Thayetmyo which are the principal ones, under one officer as a separate division. Whether the Myanoung tracts should be added to this charge is matter for consideration. Bassein should not,—it is too far off.

"Cutch Division" should be formed.

I have, &c., &c.

B. H. BADEN POWELL,

Offg. Inspr. General of Forests.

CUTCH RESERVES.

East of the Irrawaddy.

Upper Satsoowah Cutch reserve.

1. Subject to the result of a local inquiry as to the existence of Toungya cultivation and bearing in mind that the reservatian of the proposed Satsoowah "Teak Reserve" (No. 51) has been abandoned to provide for such cultivation the eastern half of this Cutch Reserve will be taken up between the Satsoowah Choung and the Kyouk-lat-kyau.

Lower Satsoowah, Cutch Reserve.

2. The portion to be taken up will be limited to the tract between the Satsoowah Choung on the west, the water-shed between the Satsoowah and Bongoong on the east, the second feeder of the Satsoowah Choung on the north, and the extreme limit of the Cutch producing Forest (as indicated in the map) on the south.

Bangoong Cutch Reserve.

3. The part to be taken up to be limited to the eastern portion (as indicated in the map) with the exception of the part lying east of the road from Hlanding village to Ye-book Choung, and that also lying west of the sharp bend in the course of the Bangoong Choung.

Thabyee-hla Cutch Tract.

4. This entire tract approved of as applied for.

Deedoo Cutch Tract.

Deedoo Tract Rejected.

This tract rejected *in toto*—and is struck out.

Ten-daw Cutch Reserve.

5. The eastern portion to be taken up by making a line of demarcation running due north from Ten-daw village to the Choung-goungyee water-shed, and making this the Western Boundary.

West of the Irrawaddy.

The reservation of the following tracts as Cutch Reserves in the Thayet-myo District has been agreed to.

I. Khyee-ba-kyaw.

Between the Khyee ba-kyaw and the cultivated lands of the villages on the bank of the Irrawaddie commencing in line with Paik-tha-line village, and extending as far south as the Gway-douk Choung.

II. South Mudday.

North boundary. The south bank Mudday Choung from the mouth of the Kamouk Choung to a point opposite the mouth of the Kangoo Choung. Thence a line of demarcation in an easterly of south easterly direction skirting the cultivation in the Mudday valley as far east as the Doon-aing Choung.

East boundary. The Doon-aing Choung from last point to its source and up to the Mudday and Shoay-tangah water-shed.

South boundary. The Mudday and Shoay-tangah water-shed from source Doon-aing Choung to source of Kamouk Choung.

West boundary. The Kamouk Choung in its entire length.

H. B.,
D. C.

(Int'd) W. J. S.
B. H. B. P.

REORGANIZATION OF THE FOREST SYSTEM OF BRITISH BURMA.

Minute by the Honorable ASHLEY EDEN, *Chief Commissioner of British Burma, dated the 8th May* 1874.

AT the end of 1872, the Officiating Inspector General of Forests, Mr. Baden-Powell, was deputed by the Government of India to assist me in an enquiry regarding the extensive abuses which had occurred in connection with the administration of the forests of the Sittang Division. His time was for some months much occupied with the investigation of a series of cases arising out of these frauds, and he successfully instituted prosecutions against the defaulters. The result of these enquiries was to show beyond all question, what had indeed become apparent to me before, that the whole system of working the Government forests under permits or licenses was entirely unsound. The Government of India accordingly directed that Mr. Baden-Powell should remain in Burma until he had, in communication with me, drawn up a scheme for the entire reorganization of the forest system of British Burma. During his residence in Burma, I was constantly in communication with Mr. Powell on the subject, and had ample opportunity of discussing with him the shortcomings of the existing system and the remedies which it seemed necessary to apply. The result of Mr. Powell's investigation is to be found in the report addressed to me and forwarded with his letter of the 9th December 1873. This report was forwarded to the Conservator of Forests, and his reply, which has been prepared after consultation with other officers of the Department, has only just been received. Mr. Baden-Powell has dealt with the whole question in a very clear, concise, and exhaustive report. Having carefully considered Mr. Powell's propositions with him, it is hardly necessary to say that they have my entire concurrence, though there are a few small questions of detail on which I am not altogether prepared to accept his views without modifications; these, however, are unimportant matters, and need hardly be discussed in the present state of the question.

2. In connection with forest conservancy and administration, we have to consider the subject from three points of view:

1*st*.—The maintenance and improvement of certain selected forests for the production, on an organized and scientific system of supply, of a quantity of teak timber equal to the probable demand for the public and the State.

2*nd*.—The maintenance and preservation of large tracts of forests of secondary value for purposes of direct utility, but the existence of which, from climatic considerations, is absolutely necessary for the well-being of the province.

3*rd*.—The preservation from reckless waste of such forest products as the people have been in the habit of using, and the use of which it is necessary to preserve to them, and which is indeed essential to the growth and prosperity of the population, such as wood and posts for house-building, fuel, bamboos, boat-pieces, grass, &c.

3. As to the first of these proposals, Mr. Baden-Powell shows—and it seems to me that there is no possible room for doubt on the subject; indeed, it has always been recognized as an ulterior object by the Department—that it is necessary to concentrate our main reserves. Instead of having scattered forests and plantations, whole districts conserved and kept from the people, because they contain a few isolated trees, it is proposed to come to a conclusion as to the area which should be placed under first class conservancy in order to produce the quantity of timber which it is thought that Government should be prepared to produce. This having been determined, sites for these reserves are to be selected: they are to be in places affording facilities for export and control, and are to be compact areas of the very best forest land in the country, either having on them a full and complete stock of trees of the very best growth and growing trees of the middle class, or having old forest, partially destroyed by over-cutting, but having such advantages of soil and exposure as to render them capable of successful restorative treatment. These selected tracts will be formed into compact forests by artificial restoration and natural reproduction combined. All blanks will be planted up, shade-giving trees encouraged, bamboos and creepers eradicated, and fires, which are the greatest enemy to successful teak cultivation, kept out. It is only by concentrating the energies of the Department on these selected tracts that any real progress can be made in obtaining first class teak forests at a reasonable cost. At present nothing is done in the way of real forest conservancy by means of actual improvement of the timber-yielding area, except the maintenance of a few scattered and not promising plantations kept up at a great expense. The duties of our small staff are too divided and miscellaneous to permit them to give proper attention to such matters. Another result of this selection of compact areas, which is more important almost than any other, will be that we can surrender to our growing population the hundreds of thousands of acres of good land from which they are now excluded, because they have scattered patches of teak or isolated trees spread about throughout them. As to the area which it will be necessary to form into these special reserves, I think that the Officiating Inspector General and the Conservator are right in suggesting that we should aim at ultimately having 250 or 300 square miles of compact teak forest; 250 square miles =160,000 acres, which should, it is calculated, give an annual supply of 128,000 tons or 6,400,000 cubic feet of timber, which is in excess of the average annual outturn of British and foreign timber together for the last six years. In addition, to this, there

will be the timber from the ordinary forest reserves, which will be alluded to hereafter, and such timber as may continue to be imported from beyond the frontier. I think that 300 square miles will be a reasonable area to take. Our present teak-producing forests are estimated at 2,397 square miles.

4. The Conservator, while concurring entirely in the proposal for devoting all the energies of the Department to the formation of compact special reserves, proposes certain modifications which have my approval. Mr. Powell would apparently—though I am not quite certain that this is his meaning—exclude all *toungyas* from the area of special reserves. The Conservator, however, having regard to the remarkable success which has attended the experiment of paying the Karens, who are the great *toungya* cultivators, to plant and conserve teak for us, would allow them to continue doing so on certain conditions which are detailed in paragraph 24 of his letter of the 28th February. The least promising part of the special reserves will be made over to *toungya* cultivators without restriction, on the condition that with their crop they plant teak seedlings and cut all existing teak trees flush with the ground, so as to ensure young suckers being thrown out which will not overshadow and suppress the seedlings around them. There is certainly no system of planting teak so economical and so satisfactory in every way as this planting in *toungyas* by Karens. The Conservator has found some of their plantations grown under this system stocked with seedlings 700 to 800 per acre, at 6 by 6 feet apart. The cost per acre under this system for a first class plantation is Rs. 31 only; the net cost of our existing plantations is Rs. 56 per acre on an average, while two of them are as high as Rs. 95 and Rs. 100. On the whole, then, I am entirely in favour of Captain Seaton's proposed modification of Mr. Powell's proposal, especially as it appears that under this system we can without difficulty plant 1,000 acres a year instead of 350, our present outturn. The system has been tried, and has been found to be an entire success; I would therefore give it every possible encouragement.

5. Thus much for the system of special reserves. I now come to what Mr. Baden-Powell calls the ordinary reserves, or the second point of view mentioned in my second paragraph. The objects of the ordinary reserves are twofold:

(1) The maintenance and preservation of forests for climatic reasons.

(2) The preservation of the existing teak forests pending the constitution and growing maturity of our special reserves.

There is no room to doubt that the great fertility and the extraordinary prosperity of British Burma as a rice-producing country is mainly due to the fulness and unvarying regularity of its rainfall; unfortunately, the denudation of the tops of the hills has been chiefly carried on in the part of the country where the rainfall is most uncertain, and, as Mr. Powell says, we have no means now of judging how far the short rainfall there is due in any extent to the clearing of the hills; but there is no sort of question that the maintenance of the forests on the mountains is essential to the collection and distribution of the water-supply, the protection of the stream heads, and the preservation of the springs and perennial streams. Without the forest, the hillsides will be denuded of all good soil, and during the rains the plains below will be destroyed by uncontrolled torrents forcing their way over the culturable plains; it is therefore proposed to include in the ordinary reserves, the whole of the hilly range between the *Dipterocarpus* forest and the Yomas, portions of the *eng* forest being included in places where its denudation is threatened. Within these tracts, however, arrangements must be made for *toungya* cultivation under proper regulation, and it must be made, as proposed by Captain Seaton, a condition of *toungya* cultivation that a certain portion of the *toungya* shall be planted with teak seedlings.

The next consideration in fixing the boundaries of the ordinary reserves is the supply of teak during the gradual formation of the special reserves. This of course is essential, otherwise the supply of teak for the market from our forests would cease for a time; but for this reason it will at first be necessary to include in the ordinary reserves the bulk of the existing teak forests. There are large tracts of indifferent outlying forests which should at once be abandoned, and this is fully recognized by Mr. Powell in the foot-note to paragraph 102 of his report. In these ordinary reserves the *Dipterocarpus* and other valuable trees will be preserved, and if fires are kept out, a valuable supply of the woods most necessary for the wants of the people will be maintained, and the collection of forest produce, such as varnish, wax, honey, cart wheel axles, house-posts, and boat hulls, will be allowed under only so much supervision as will prevent the waste now going on, and which threatens in time to deprive the people of materials essential to their prosperity.

6. I now come to the question of district forests: these may be called the *people's forests*. Their object is to conserve for the people near their homes such articles of forest produce as are connected with their daily life. The formation of these district reserves has always been recognized as a point to be kept in view, and the old land sale rules provided for the reservation of lands near a village from sale and lease. The growing scarcity of the woods most required by the people was some time back brought to the notice of a committee of [illegible] officers assembled at Rangoon, and it appears to be clearly admitted that the time has come for preserving the village forests from the depredations of outside speculators.

7. The district forests will be entirely under district officers, and in no way under the Forest Department; certain valuable classes of trees will only be felled under an order of the district officer; the right of working the wood-oil and varnish trees will be leased; the collection of honey and bees-wax will be allowed under existing system; and the trees on the old banks of creeks, streams, and roads will be preserved. All other forest produce will be free to the people. The proceeds of these forests will be formed into separate funds under the Deputy Commissioners, and with these new village plantations will be made of the trees most required

by the people for their houses and cultivation. The object of forming the district reserves is not to raise revenue for Government, but to provide for the convenience and well-being of the people.

8. Now, as to the mode of working the forests, I entirely approve of Mr. Baden-Powell's proposal to divide the whole of the ordinary reserves, excluding, however, such portion of those as are set aside for the formation of special reserves, into ten blocks, and each block into ten compartments, each containing, as near as can be ascertained, an equal number of first-class trees. The trees of certain compartments to be cut and taken out at certain fixed periods by a system of close felling of all first class teak trees, the outlying tracts being taken first in order to their release from the control of the Department. For the reasons stated by the Conservator in paragraph 11 of his memorandum No. 1838-124, dated 28th February 1874, I would leave the minimum girth of trees to be felled at 6 feet as originally determined on. It seems to me that this system would be quite safe, the future supply of trees being fully provided for by the formation of special reserves.

9. For the reasons stated in paragraph 9 of the Conservator's memorandum, the scheme may requre modification so far as to admit of more than one compartment being worked in each year.

10. In regard to the plantation and the working of special reserves, I entirely concur with the Officiating Inspector General and the Conservator.

11. As regards establishment, I entirely concur with Mr. Baden-Powell, especially in the recommendation in paragraph 253, that attempts should be made to secure the services of the better classes of Burmans in the Department. Certainly, the only Burman Assistant Conservator now in the service of Government is one of the best officers we have, and it must be possible with good management to attract others of this class.

12. Captain Seaton's proposed amendment (paragraph 35), namely, to have a lower grade of forest rangers on Rs. 75, has my approval.

13. I cannot agree that there is any necessity for giving special Burma allowances to Assistant Conservators. The service in Burma is popular and healthy, and, except in large towns, living is not expensive. I think that the Assistants stationed at Rangoon should receive house allowance at the rate of Rs. 80 a month. If forest officers receive special allowances for serving in Burma, officers in other departments may with justice claim equal consideration; and the grant of these special allowances is, as I have already had occasion to point out, calculated to give rise to an unwarrantable prejudice against service in Burma. It is argued, not unnaturally, that if special allowances are necessary to induce men to reside in Burma, there must be something in the climate or mode of life which compares unfavorably with the climate and mode of life in India; whereas the contrary is the case, and I am sure that the majority of the officers of Government now in Burma would exchange their position for a similar one in India with regret.

14. I am of opinion that it is very essential that an Assistant Conservator of experience should be attached to the Chief Commissioner's office as Assistant Secretary. The Secretary in the Department of Public Works is also Chief Engineer as well; he is constantly absent from head-quarters, and certainly has no time to study forest matters. The Assistant Secretary is a young officer of Engineers, who has no opportunity of obtaining any knowledge of forest administration; he has quite as much as he can do, as Assistant in the Public Works Department and as Assistant to the Chief Engineer; the consequence is that the Chief Commissioner has little or no competent assistance in dealing with forest matters, and has to go into every question of detail himself. I can safely say that for the last two years I have been more perplexed and troubled by the forest administration than by any other work. I would transfer the Forest Department to the General Secretariat, placing it under an Assistant Secretary selected from among the forest officers, and would give him such establishment as may be necessary. I am quite sure that this will be economy in the end, for an ill-considered or hasty order passed in the Forest Department, on perhaps insufficient information, may cost the Government thousands of pounds. It is a special subject requiring special knowledge, and cannot be picked up in a day by a new Chief Commissioner or a new Secretary.

15. The Forest Department is altogether too weak in Burma for the work it has to do; it should have a sufficient number of good and picked men for its own actual work, and a certain number of supernumeraries who might be initiated into forestry in Burma, where the field is greater than elsewhere, and then sent to other provinces.

16. There are two other points which seem to me to require notice—the question of permit working as against direct working, and of girdling as against live-felling. First, as to girdling, a great deal has been written, and a great deal of violent language has been used by the advocates of both systems. After a careful consideration of the subject, I have come to the conclusion that though there is reason to believe that girdling does injure the timber, and though it involves an extra expenditure of labour, and though from allowing the trees to stand till seasoned for felling it would interfere with the working of high forest, yet it does afford a check against fraud on the part of permit-holders, if properly worked, and it does prevent grasping and needy foresters from bringing unseasoned wood into the market and spoiling the reputation of Burma timber.

17. I certainly hope, however, that we are to have no more felling by permit-holders except in outlying and comparatively valueless forests; and when Government works its own plantations with its own establishment and contractors, there will be no object in maintaining girdling as a check. It may then try experiments with the two systems in its forests and girdle part and live-fell part, storing it in proper depôts to season naturally, or it may even adopt a system of seasoning by the artificial expression of sap. The whole matter will be in

the hands of Government and its officers, and it may do what it finds to be best for the timber without regard to any other consideration.

18. As to the system of working our forests under the system of permits, I have no hesitation in saying that though, on the first introduction of our system of forest conservancy, it may have been the most convenient, and perhaps the only practicable way of working the forests, yet the results of the past few years show that, in point of fact, it takes the Government reserve of valuable timber entirely out of the hands of Government officers, and offers a premium to fraud and conspiracy against the interests of Government in every grade of the agency which it interposes between Government and the clearing of Government timber. In my minute of the 20th May 1873, written now a year ago, I said—"I should like to have a careful estimate made of the relative net value to Government, at Rangoon, of a ton of timber worked under the permit system and of a ton worked by small contractors acting directly under the orders of the Government officers. If more convenient, the estimate may be made by the log instead of by the ton. We have lately had very full proof of the evils of the permit system, and of the entire want of any security for the interests of Government under that system. It remains to be considered whether it has any advantages as a set-off to these disadvantages. Is there any object in the employment by Government of middlemen between its own officers and the small working contractors, who do the real work of felling and extracting both under the permit and direct system? So far as I am able to judge, we, under the permit system, surrender to a European or wealthy native speculator a very considerable share of the profits of the forests for which we can never get any real equivalent, while we at the same time give up all power of effective control over the forests, and give to one or two firms a sort of monopoly in the market, of timber the produce of Government forests. It must now be decided whether it is for the interests of Government to work the forests directly under its own officers through petty contractors, or to continue to work through permit-holders."

19. The further experience which I have had of the subject since then—and this has been very considerable, owing to the litigation with the Burma Company and proceedings connected with the cancelling of other permits—has convinced me that the opinion I then expressed was founded on a substantial basis. It would hardly be possible to find stronger evidence of the evil of the permit system than is contained in the fact that, in the few years during which I have administered the province, I should have had to cancel no less than ten permits out of seventeen which exist in the Sittang division alone. Mr. Baden-Powell, in paragraphs 330—353, points out very forcibly and very truly the disadvantages of the permit system. The Conservator of Forests, Captain Seaton, who has for many years had the working of this system, says (paragraph 45): "The disadvantages connected with the permit system are however so numerous, and loss of revenue so considerable, that it would certainly be better to discontinue it altogether, or retain it only in localities contiguous to the frontier, where the cost of working may be very great, and risk of loss of elephants and timber is to be apprehended.

20. We are now working in the reserved forests by Government agency direct, employing sub-contractors, precisely as the permit-holders do, under the immediate supervision of our own forest officers. The system is working admirably. As to the financial effect of the two systems, Mr. Powell's letter shows that by the present system there was in Beeling forest a loss to Government, over what it would have obtained for direct working, of 10 rupees per log, Domdame 12, Yoonzaleen 14, Thoungyeen 6 rupees. Taking all the timber of the past nine years, we have lost an average of Rs. 4-5 per ton by the employment of permit-holders. If only first class timber were taken into account—and it is this with which the permit-holders chiefly employ themselves—the difference in favor of the direct Government system is Rs. 22 per log, and even more. Mr. Powell, in paragraph 332, puts it as high as 30 and 40 rupees in some cases. Now, a difference of Rs. 4 or Rs. 5 on 50,000 tons is a very considerable sum in our forest revenue, and as Mr. Powell asks "Why should Government suffer this loss?" I am altogether unable to say why. The only advantage urged in favor of the permit system is that when conservancy was in its infancy, permit-holders advanced capital to foresters and enabled them to purchase and bring into the forests a large number of elephants; but the permit-holders did nothing more than make advances at exorbitant interest to foresters, to whom they gave sub-contracts. Why should not the same result have been attained by Government working direct with the sub-contractors and making them the necessary advances without charging the exorbitant interest? We should certainly have got a more substantial and better class of sub-contractors than many of the permit-holders have left behind them.

21. Anyway, we now have an ample number of sub-contractors ready to hand and willing to work for us; many of them now are actually working for us. Why then should we place middlemen between us and them, whose profits are to be derived from the enormous charges to which they subject sub-contractors, and who speculate on being able to get from the forest something in excess of the value of the timber as represented by the permit fee [illegible], often tendering in the dark?

22. In some outlying forests it may be necessary to work [illegible], as these forests are to be cleared with a view to surrender as forest reserves; it does not much matter what is done; but even with these I believe contractors would be found to be more profitable and more beneficial in every way. If the present system, however, is adopted in any forests, the form of permit must be amended.

23. The rules framed by Mr. Powell have my concurrence, except that I wish for further consideration of the direct forest rules. The Conservator is now discussing them with district officers.

24. In conclusion, I must take this opportunity of recording my recognition of the admirable manner in which Mr. Baden-Powell performed the difficult duty entrusted to him,

and of the exhaustive treatment which the whole subject has received. Captain Seaton too deserves great credit for the hearty and cordial spirit in which he has seconded Mr. Powell's efforts, and for the readiness with which he has accepted a reform of his department.

25. Some rules have been prepared by Captain Seaton for the selection of reserves which have my approval.

No. 1593-2F., dated Rangoon, the 21st May 1874.

From—Captain W. G. CUMMING, R. E., *Assistant Secy. to the Chief Commissioner of British Burma*, P. W. DEPT.,

To—*The Secretary to the Government of India.*

IN reply to your letter No. 495, dated 11th April 1874, I am directed by the Chief Commissioner to submit copies of papers as per margin, together with a minute by Mr. Eden, dated 8th May 1874, on the reorganization of the forest system of this province.

Letter No. 1862-124, dated 5th March 1874, from Conservator of Forests.
Report by Captain Seaton on the conservancy and management of forests under revised working-plan of 1868, and review of forest administration subsequent to 1856.
Memo. No. 1838-124, dated 28th February 1874, by Conservator of Forests, on the proposals of Mr. Baden-Powell in his report on the forest system.
Memo. No. 1856-21, dated 28th February 1874, by Conservator of Forests, on selection of ordinary and special reserves.

No. 1862-124, dated Prome, the 5th March 1874.

From—Captain W. J. SEATON, *Conservator of Forests, British Burma*,

To—*The Secy. to the Chief Commissioner of British Burma*, PUBLIC WORKS DEPT.

IN accordance with the orders communicated in the letters marginally noted, I have now the honor to forward, for submission to the Chief Commissioner,—

No. 1533-74F., dated 4th June 1873.
No. 22-2F., dated 12th January 1874.

I.—A report on the conservancy and management of the forests under the revised working-plan of 1868, and review of forest administration subsequent to 1856.

II.—Memo. No. 1838-124 of 28th February 1874, on the proposals contained in the Officiating Inspector General's report on the forest system of this province.

III.—Memo. No. 1856-21 of 28th February 1874, on the procedure for setting apart reserved forests and submitting a scheme for the selection of, and procedure connected with, ordinary and special reserves.

2. The report on the conservancy and management of the forests was in print ready for submission as far back as December, but the report of the Inspector General being then daily expected, I deemed it best not to forward it till the whole subject connected with the future management of the forests was under consideration by Government.

3. With regard to the memorandum on the proposals of the Officiating Inspector General, I have to mention that it has been drawn up after careful consideration and consultation with several of the officers serving under my control.

4. It has occurred to me to submit definite proposals on several subjects discussed by the Officiating Inspector General. Among these I would specially commend to the consideration of the Chief Commissioner the proposals for the systematic employment of the hill Karens in the special reserves and ordinary reserves, under agreement, on the part of Government, to abandon certain *toungya* lands to them free from all conservancy restrictions.

I may say that the feasibility of the scheme has been fairly tested, and in proof of this I have only to point to the excellent results obtained by the employment of these people during the past rains, when upwards of 200 acres have been so planted as to present the appearance of regular and well-stocked plantations. These results, I may add, have been obtained simply by giving the Karens to understand that definite areas would be abandoned to them, and that strict conservancy would ultimately be limited to the special reserves.

The long-vexed question of obtaining a suitable description of labour for the improvement of the upper teak forests may be said to be now fairly solved, and it is not too much to say that, with the assistance of the Karens, the work of improving the forests will be henceforth a comparatively easy undertaking.

All that is required is for the local Government to sanction the general adoption of the scheme already started in the Tharrawaddie, and already joined in by no less than eight Karen *tays* or villages, of which three have, as noted in the past year's progress report, moved into the Mo[illegible]eling reserve.

5. With regard to the scheme for the selection and setting apart of special and ordinary reserves, I have to mention that I have consulted with the Deputy Commissioners at Rangoon, Henzadah, and Prome, and believe they are all agreed as to the necessity for having a joint visit and open inquiry on the part of both the civil and forest officers at places contiguous to the proposed reserves.

It, however, cannot be denied that civil officers find it extremely difficulty to spare time to visit the more remote portions of their districts; but it is to meet this difficulty that I have proposed a joint visit to certain places, where it will be possible for the people interested to meet on whatever day is fixed by the civil district officer.

REPORT ON THE CONSERVANCY AND MANAGEMENT OF THE FORESTS OF BRITISH BURMA UNDER THE REVISED WORKING-PLAN OF 1868, AND REVIEW OF FOREST ADMINISTRATION SUBSEQUENT TO 1856.

Prefatory remarks.

BEFORE describing the system now in force and its results up to date, it will be useful to note briefly the extent and general character of the forests and the results of early forest administration. Hence this report will be divided into—

Part I—Showing (1) the extent, position, and character of the forests subject to conservancy; (2) the establishment available for protective and administrative purposes.

Part II.—The general results of forest administration prior to 1868.

Part III.—The system inaugurated by the revised working-plan of 1868, its results, and the conclusions they point to.

PART I.

The extent of the forests.

1. The area occupied by forests of every description, including non-culturable waste, is estimated at 41,377 square miles, but of this area only 7,000 square miles can be said to represent the forest lands under the control and administration of the Forest Department, as provided for in the Forest Rules promulgated under Act VII of 1865.

Area of teak forests under conservancy.

2. Within this latter area, *viz.*, 7,000 square miles, conservancy has until a very late date been limited to the teak-producing forests, which are estimated at 2,397 square miles in extent.

Position of the teak forests.

3. With but few exceptions the teak forests are restricted chiefly to the hills and the high ground at their base, the former rising in places to an altitude of 2,000 feet, and the latter occupying the undulating ground between the hills and the large belts of eng forest or forest of *Dipterocarpus tuberculatus*, which generally hold an intermediate position between the plains and the high ground.

4. The teak forests may be said to represent three distinct classes:

Classification of teak localities.

(1). The upper teak localities on the hills, where the tree attains the finest proportions as regards height and symmetry of growth.—The characteristic features of hill teak are its slow growth and development of clear stems of a more or less cylindrical shape, averaging from 40 to 80 feet to the first branch. Yet tracts are met with in which the growth is indifferent, the stems being shorter and fluted. In these, however, the soil is very dry and stony, whereas over the greater portion of the hills the trees grow on ridges and slopes having a light loamy soil more or less enriched with humus, and mixed with detritus of the underlying rock, and varying in depth from a few inches to 2 or 3 feet.

The geological formation is generally grey sandstone, but to the east of the Sittang river granite enters largely into the structure of the underlying rock, and limestone is met with in the teak localities near and east of the Salween.

(2). The lower teak localities occupying high undulating ground at the base of the hills, and extending along the alluvial banks of the streams in the eng or *Dipterocarpus* forests, or wherever in such forests a little diluvial soil has collected over the laterite slopes and hollows.—Compared with the hill timber, the teak in these localities exhibits less regularity of growth in the stem; and in places where there is a very poor sandy surface soil, or the drainage is defective, the trees develop fluted and buttressed stems. They appear also to suffer more severely from the periodical fires, the result doubtless of proximity to the plains and the presence of a very rank undergrowth.

(3). The plain forests generally on the higher blocks of ground immediately below the line of eng or *Dipterocarpus* forests, and along the banks of the streams and extending to the edge of the inundated lands.—The sub-stratum is usually clay, which is found at various depths; the surface soil is also largely mixed with clay; and the drainage of these forests is, as a rule, very defective as far as teak is concerned.

Upper teak localities.

By reason of their remoteness and the greater difficulties in the extraction of timber, as well as the existence of numerous rocky obstructions in the channels of the streams, the forests of this class suffered little at the hands of timber cutters prior to the occupation of the province. Hence, although much injured in places by toungya cultivators, they have formed, and continue to form, the chief source of supply of teak timber for the market.

As a consequence of toungya cultivation being carried on chiefly on the lower slopes of the hills and along the beds of the ravines, the tracts abounding in mature teak are now almost wholly restricted to the crests of the spurs and the higher ranges of hills, where the steepness of the slopes and poverty of the soil, compared with that in the beds of the ravines, have served as a check to the spread of toungya cultivation.

In places immunity from toungya cultivation is attributable to the opportune flowering of the bamboo, the cultivators preferring localities well covered with mature bamboo, instead of the dense crop of young bamboo which covers the ground like grass after the death of the parent plant.

Another cause of escape from "ya" cultivation is a change in the vegetation after the flowering of the bamboo, which results in some instances in the bamboo disappearing, and the ground being wholly occupied by seedlings of the surrounding trees.

The finest teak tracts are generally those in which bamboo of the kyathoung (*Bambusa arundinacea*), "tin" (*Cephalostachyun*), and "wa-net" varieties form the undergrowth, the teak saplings being sheltered and drawn up with clear branchless stems to a great length in competing with the lofty bamboos around them.

The prevailing trees found associated with teak in the hills are "pynkadoe" (*Xyliadolabriformis*), bambwe (*Carea arborea*), "myoukchor" (*Homalium tomentosa*), gyo (*Schleichera trijuga*), bingar (*Nauclea*), yendike (*Dalbergia latifolia*).

The proportion teak bears to other trees is generally not more than 1 in 10. In the richest teak tracts trees first class size (over 6 feet in girth) are from 1,000 to 3,000 on the square mile.

The average is generally from 500 to 1,000 first class trees on the square mile, or 300 to 700 of first three classes, *viz.*, 1 foot 6 inches, 4 feet 6 inches, and 6 feet girth and above on 100 acres.

Lower teak localities.

6. Upon the resources of these localities there was a heavy drain for local consumption, as well as for purposes of sale, prior to the occupation of the country, this being borne out by the numerous old stumps of mature trees and trees of a medium size suitable for house-posts, and the large quantity of seasoned teak timber, both standing and felled, found in many of the tracts when brought under conservancy. Forests of this class differ very much in their productive powers, and it is often difficult to judge of their capabilities owing to the mutilated condition of the larger trees yet to be found, it having been a common practice before the occupation of the province to cut large pieces several inches thick out of the stems of standing trees for the manufacture of axles, yokes, and other implements. Over well-drained areas, where a sufficiency of soil (loam mixed with humus) is met with, the trees almost rival those on the hills. The forests on the banks of the Thoungyeen river in the Salween division, the Gwaydouktsan and Lower Minlha, Myoung, and Gnapeeing forests in the Tharawaddie, fall under this class, and have yielded considerable quantities of marketable timber during the past twelve years. Similar to these are the Lower Myolha forest and Lower Tsamoh forest contiguous to the eng or *Dipterocarpus* forest in the Sittang division, and in which operations were being recently carried on by the permit-holders when the forest was resumed.

The plain forests.

7. In most parts of the province nothing remains of the plain forests but a few solitary first class trees and belts of young trees. The latter preserve a regular growth till from 2 to 3 feet in girth, but afterwards large buttresses are developed, apparently from the excess of moisture in the soil. The trees too are more subject to injury form creepers, and assume the most irregular from of stem in their struggle against the dense and quick-growing vegetation around them. Another cause of irregular growth is doubtless mutilation and injuries to which the young trees are subject at the hands of the population and from the cattle herded among them. Yet forests of this description, from the existence of numerous stumps, must have yielded in the Burman time large supplies of timber, apparently for local consumption. Forests, on the other hand, which from their extent and position suffered less at the hands of the population, still contain marketable timber of superior quality. An instance of this is the Kangyee forest in the Tharawaddie division and the Shwe-kyundau or Royal Forest in the Prome division.

The former on the occupation of the country was found studded with mature trees of huge proportions, averaging from 9 to 12 feet in girth, and having regularly shaped stems.

This forest is specially referred to in the progress report for the years 1857-58 to 1859-60, page 22, and is estimated to contain upwards of 5,000 first class trees at the present time. Up to date it has yielded 1,175·2 tons of marketable timber, including 1,864 sleepers.

The Royal Forest, covering an area of 238 acres, is described in the progress report for 1856 as one of the most remarkable forests in the plains of British Burma, and as an instance of what teak trees will attain to in such localities when protected from all interference, by reason of the superstition of the surrounding population or from other causes.

Between the years 1861-62 to 1865-66 this forest, estimated to contain 1,800 first class trees in 1856, yielded upwards of 1,073 logs and 553 sleepers, or 1,051·6 tons of marketable timber obtained from dead and fallen trees, and 385 trees girdled by the Department.

System of protection.

8. For protective and other purposes the forests of Pegu and Tenasserim are divided into six main divisions, selected according to their geographical position and a common outlet for their resources by one of the principal rivers:

1. Rangoon.
2. Tharawaddie.
3. Prome, east of Irrawaddie.
4. " west "
5. Sittang.
6. Salween (excluding the extreme southern forests on the Yea, Tavoy, and Tenasserim rivers).

These divisions are sub-divided into districts corresponding with the natural divisions of the country, each district being usually represented by the area drained by one main stream and its tributaries.

Each of these districts, the forests of which vary in extent from 50 to 300 square miles, is in charge of a local subordinate officer, termed forester or goungwai, assisted in some cases by

a sub-forester. Several of these districts form the charge of a forest ranger under the control of the Deputy Conservator in charge of the division or the Assistant Conservator entrusted with the charge of a sub-division or large section of a division.

Protective and controlling establishment for the forests.

9. The strength of the forest protective and administrative establishment at present is as follows:—

		Rs.
1	Conservator, 3rd class, at	1,000
3	Deputy Conservators—	
	1 of 2nd grade at	900
	1 of 3rd „ „	700
	1 of 4th „ „	500
2	Assistant Conservators, 1st grade, at	450
4	„ „ 2nd „ „	350
5	„ „ 3rd „ „	250
2	Sub-Assistant Conservators (probationers)	200
9	Forest Rangers—	
	2 at	150
	1 at	100
	3 at	50
	3 at	30
18	Forest peons—	
	2 at	12
	16 at	10
42	Foresters and 16 Sub-foresters } From Rs. 5 to Rs. 10 per mensem.	

If the Conservator and Personal Assistant be excluded, the control and protective establishment will be found to bear the following relation to the areas of teak localities to be protected:—

1 Officer of the controlling establishment to 479·4 square miles.
1 Forest ranger to 266·3 square miles.
1 Forester or under forester to 57·3 square miles.

But the teak localities being spread over about 7,000 square miles, or three times their own area, the actual proportion will be—

1 Officer of the controlling establishment to 1,400 square miles.
1 Forest ranger to 777·7 square miles.
1 Forester or sub-forester 120·7 square miles.

Control establishment for the rivers and timber in transit.

10. In addition to the protective establishment noted in the preceding paragraph and the forest rangers, there is the following establishment available for the control and protection of timber in depôts and in transit on the rivers:—

		Rs.
1	Overseer	100
4	Goungs	20
1	Goung	15
2	Tindals	15
1	Tindal	12
13	Lascars	10
2	Peons	12
4	„	10

Extra or work establishment.

11. Entirely exclusive of the above is the extra establishment employed solely for, and charged against, the extraction of timber from the forests. Occasionally when engaged in duties such as blasting plantations, &c., the salaries of subordinates on this establishment are charged under the budget allotment for these respective heads. This extra establishment consists at present of—

		Rs.
10	Burmese and English writers and timber measurers at a cost per mensem of	435
2	Overseers	225
1	Forest ranger	60
3	„ goungs	60
2	Interpreters	65
46	Forest peons	489
1	Tindal at Rs. 20 }	
4	Lascars at „ 12 }	68
	Total ...	1,377

PART II.

The general results of forest administration prior to 1868.

1. The first measures towards the conservancy of the teak forests date back to 1833, when the Government of India sanctioned the entertainment of a small native establishment for planting and other purposes in the Tenasserim division.

Subsequently various rules were successively promulgated, but these had reference more to the working of the forests under the license system than to any direct procedure for their conservancy. An officer was also appointed as Superintendent.

Teak plantations were commenced at the source of the Attaran and on the banks of the Salween, but after 43½ acres had been planted up at a cost of Rs. 750 per acre, and much sickness had broken out among the Madras coolies, the work was abandoned.

It was only in 1856, after the occupation of Pegu, that rules for the preservation of the forests came into force, the period prior to that, *viz.*, 1853 to 1855, being occupied chiefly in gaining information of a general nature regarding the nearer or outlying forests, and controlling the extraction of timber felled by private parties prior to the 30th May 1853.

Subordinate officers or foresters were also appointed for the first time to the charge of the more important forests, but the controlling establishment consisted only of the Superintendent and a small office and depôt establishment.

Two periods prior to 1868.

2. The twelve years embraced between 1856 and 1868 may be divided into two periods, *viz.* :—

I.—From 1856 to 1861, representing the period devoted to the gradual organization of the Forest Department, survey and examination of the forests, and the compilation of a working-plan, and introduction of a regular system in the selection of trees to be killed, and the extraction of timber.

II.—From 1862 to 1868, the period in which the working of the whole of the forests was developed and perfected, operations undertaken for removing obstructions in the "floating" streams, the examination and topographical survey of the forests in need of protection were taken in hand, and the experimental cultivation of teak jointly with grain and other crops commenced.

Result of the first period, 1856 to 1861.

3. The results of the first period may be thus summarized :—

Organization of the Forest Department.

(1). The establishment at the outset consisted only of the Superintendent located at Rangoon and a small office establishment, while for the protection of the forests there was an establishment the cost of which was only Rs. 605 per mensem. The cost of the entire establishment amounted to only Rs. 1,778.

In some cases the district civil officers acted as *ex officio* forest officers, but entirely in matters connected with office routine at head-quarters, accounts, and collection of revenue.

As the working of the forests was developed, the establishment was increased from time to time, and at the close of 1861 stood as follows :—

		Rs.
	Conservator of Forests	1,000
	Examiner of Forest Accounts	350
3	Deputy Conservators of Forests, at Rs. 600, Rs. 500, and Rs. 450	1,550
2	Assistant do. do. do. at Rs. 350	700
1	Assistant Conservator do. do. at	250
	Office, depôt, and forest establishment	2,882
	Total ...	6,732

The above include the conservancy establishment for the Tenasserim forests, the charge of which was amalgamated with that of Pegu in 1857.

Survey and examination of the teak forests.

(2). During the six years between 1856-57 and 1861-62 the following results were obtained in the survey and examination of the forests :—

Divisions.	Area surveyed.	First class teak trees counted.
Rangoon	4·499	2,619
Tharawadi	12·560	12,461
Prome	11·76	15,483
Sittang	5·1913	15,181
Salween	20·6362	21,532
Total ...	54·7365	67,276

Compilation of working-plan of 1856-57.

(3). On the data available in 1856-57 the area of the teak-producing tracts was estimated at 2,397 square miles, and the number of first class trees on this area was computed at 1,855,000, of which two-thirds were then taken as representing trees standing in localities accessible enough to admit of their removal.

It being assumed from information then procurable that a period of 24 years would be required for the trees of the second class, 4 feet 6 inches in girth, to attain the first class size, *viz.*, 6 feet in girth at 6 feet from the ground, the teak-producing forests in each of the provinces of Pegu and Tenasserim were respectively divided into six main divisions, in one of which, in the case of each province, one-fourth of the available first class trees was to be girdled annually.

The yield, however, for each separate forest district was determined with reference to the time required by the smaller classes of trees to attain first class size, the proportion also between the smaller and first class trees, and quantity of timber difficult of removal.

The annual outturn was thus computed at about 36,000 logs for the entire forests of Pegu and Tenasserim; but doubts were entertained as to whether the requisite elephant establishment was procurable to work the forests simultaneously, these animals being then scarcely obtainable in any other part than the Tenasserim Division.

Selection of trees for removal.

(4). The result of the girdling operations up to 1861-62 shews 152,282 first class trees to have been killed in the forests of Pegu. Owing to the want of a proper controlling establishment during the earlier years, doubts were entertained as to the correctness of the number of trees as reported as girdled in some of the divisions.

Forest improvement.

(5). In the second year (1857-58) of this period an experimental teak plantation was successfully formed at Prome over an area of 22 acres, and the rule was introduced of having small teak plantations about 1 acre in extent formed by the several local foresters in the vicinity of their villages.

Outturn of timber.

(6). During the first period of the working-plan of 1856-57, *viz.*, up to 1861-62, the entire number of logs extracted from the forests was as follows :—

	Logs.	Tons.
Pegu under Government agency and sort permits ...	1,07,889	73,232·85
Tenasserim, 1858-59 to 1861-62, ditto ...	59,891	47,914·
Total ...	1,67,780	121,146

Financial results.

(7). The net revenue of the Department increased during this period from Rs. 30,908 in 1859-60 to Rs. 1,26,563-11 in 1861-62, the mean annual net revenue between those years being Rs. 79,710-5.

Results of second period, 1862 to 1867.

4. The results of the second period of the working-plan, 1862-63 to 1867-68, may be thus summarized :—

Development of resources of the forests.

(1). Introduction of the system of three years' permits in the Sittang, Prome, and Salween Divisions, and of six years' leases, with right to girdle teak trees 5 feet in girth at 6 feet height from the ground, in the Upper Salween forest and forests west of the Irrawaddie.—This, together with the development of the Government agency system, resulted in the yield of the forests increasing from 24,963 tons in 1861-62 to 33,104 tons in 1867-68.

Opening of the higher forests.

(2). The removal of altogether 35 rocky obstructions, containing 16,112 tons of stone, in the channels of hill streams, whereby the resources of several hundred square miles of teak-producing forests were made available, including 300 square miles of the Zamayee or Upper Pegu forests, hitherto shut off by a series of huge obstructions half a mile in extent.

Forest improvement.

(3). Teak plantations of an experimental character were formed in the Tharawaddie and Sittang Divisions over an area of 122·5 acres; the cost, ranging from Rs. 13 to Rs. 94-14 per acre, amounted on an average to Rs. 48-10-2 per acre. The labour employed consisted of Burmese coolies hired daily, or Karennees on monthly pay; latterly (in 1866-67) Shan settlers were engaged under the hired cultivator system of Rs. 10 per acre. During the early part of this period the cutting of creepers was carried on in conjunction with girdling operations. For one season also, the clearing of teak seedlings from inflammable matter was undertaken in a part of the Tharawaddie. The total expenditure incurred in the work of cutting creepers was Rs. 1,075-8.

Protection of the forests.

(4). During this period the number of cases involving breaches of forest rules discovered by the Department was 203: of these, the number of persons concerned was 249 and the number convicted 201. The fines realized amounted to Rs. 2,366-2. Of the above, 3 cases had reference also to breaches of permits on the part of permit-holders, and resulted in separate fines amounting to Rs. 2,570.

Survey and examination of the forests.

(5). The results of the examination of the forests shew a total of 17·736 square miles surveyed with reference to their resources in the following divisions :—

	Square miles.
Rangoon	3·362
Tharawaddie	5·496
Prome	0·373
Sittang	0·372
Salween	8·133

Topographical survey.

(6). An area of 182·5 square miles was topographically surveyed in the Tharawaddie Division chiefly with reference to the selection of tracts in need of protection against toungya cultivation.

(7). Towards the close of the period proposals were submitted for the reservation of altogether 37·63 square miles in the Tharawaddie and 6·18 square miles in the Prome Division.

Area selected and proposed for demarcation.

(8). Girdling operations were carried on in accordance with the working-plan of 1856, and closed with a total of 125,290 trees killed between 1862-63 and 1867-68.

Selection of trees for removal.

(9). The following figures exhibit the outturn of the forests :—

	1862-63.	1863-64.	1864-65.	1865-66.	1866-67.	1867-68.
Under Government agency ...	20,220	11,980	9,136	16,136	19,974	19,396
Under permits	26,393	30,615	18,328	33,796	29,400	33,052

representing a total of 66,842 logs under Government agency and 171,584 logs under the permit system.

Financial results of second period, 1862-63 to 1867-68.

(10). The net revenue was as follows :—

1862-63.	1863-64.	1864-65.	1865-66.	1866-67.	1867-68.
43,557	3,17,398	3,97,368	3,07,557	11,724	3,17,399

The mean annual net revenue of the above period is Rs. 2,32,500, or Rs. 1,05,936 in excess of that of the previous period.

PART III.

Revised working-plan of 1868.

1. The revised working-plan of 1868 is of a more comprehensive and detailed character than that of 1856. It relates to a period of five years, *viz.*, from 1868-69 to 1872-73, and provides for—

I.—The general working of the forests, and selection of trees to be felled.

II.—The survey and examination of the forests with reference to their resources, the growth of teak, and collection of data for revision of working-plan.

III.—Improvement of the forests by means of plantations, and formation of reserved forests for protection as "ordinary" reserves and for works of improvement as "special" reserves.

IV.—Duties of forest ranger and foresters or goungwais.

I.—Working of the Forests.

Proportion of trees to be removed.

(1). The principal feature of the revised plan relating to the working of the forests is a reduction of 15,410 trees in the number to be yearly girdled, it being deemed advisable, on the results of an examination of some Tharawaddie timber, and in the absence of more reliable data, to reckon the period required by teak to attain maturity at 160 years, instead of 60 to 70 years as formerly, and thereby allow for the slower growth of the hill timber, which now forms the larger proportion of the annual outturn.

In the area to be subjected to a regular system of working, a reduction was also made by the exclusion of the forests west of the Irrawaddie, 200 square miles—

	Square miles.
And Upper Salween	106
Pandaw	10
Attaru	100
Total ...	216

whereby the area of the teak forests subject to the working-plan was reduced from 2,397 to 1,981 square miles.

From the number of first class trees forming the original estimate of the resources of the forests were also deducted (1) the trees standing on the area excluded, (2) the trees girdled between 1856 and 1867, (3) the number deemed to be in excess of the original estimate in certain forest districts. The total number of the first class trees was thus computed at 934,740.

In reckoning the yield of the forests, it was estimated that the material available for removal during the next 100 years, without detriment to the preservation of the forests, comprised (1) the whole of the first class trees 6 feet in girth and above; (2) the whole of the second class trees 4 feet 6 inches to 5 feet 11 inches in girth, the smallest of which, it was assumed, would attain first class size after a lapse of 72 years; (3) four-tenths of the third class trees (1 foot 6 inches to 4 feet 5 inches in girth), representing the portion which would reach second class size within 28 years.

The yield of each forest district was then computed by multiplying the total number of first class trees by the sum of the first, second, and 4 feet 10 inches of the third class on 100 acres, and dividing by the number of first class trees on 100 acres. This figure reduced by one-third to allow for losses and unsoundness, and finally divided by 100, the length of the rotation, gives a total of 12,736 first class trees as the number yearly available for removal. The maximum number was,

however, definitely fixed at 11,600 first class trees, or $\frac{1}{3}\frac{1}{3}$th of the whole, but subject to a revision at the close of the first period of five years.

Distribution of trees to be girdled.

(2). The distribution of the number of trees to be girdled in each district had special reference to the abundance of first class trees in certain tracts, where it was desirable to admit more light and air.

It was further noted for consideration, on the period of revision arriving, that the working-plan might be based upon areas instead of the stock of timber believed to stand in the forests, the five main forest divisions being divided into ten districts, and every year one-tenth of each district being selected for the removal of all first class trees.

Selection of trees to be girdled.

(3). As an experiment, instead of killing as formerly one in every four of the first class trees, the rule was adopted of selecting all marketable first class trees that could with advantage be brought away, it being assumed that 25 to 50 per cent. of the first class trees, *viz.*, either unsound trees or trees difficult of removal, would be then left to shed seed.

An exception was, however, made in the case of first class trees isolated and not associated with trees of the second class in localities known to produce good timber; an exception was also made in the case of first class trees standing near the waterways, as such localities suffered much from over-felling before the occupation of the country.

The management of the girdling work was assigned to the forest rangers as revising officers, but subject to inspection on the part of the Deputy or Assistant Conservator as superintending officer; and a set of rules was drafted with reference to the execution of the work, the branding of the trees on the heart-wood, preparation of sketch maps, and the infliction of fines, and providing for the contractor or permit-holder being invited to attend or send his agent to be present.

Results of the past five years' operations.

(4). Results of the work of the past five years may be thus summarized, *viz.*, between 1868-69 and 1872-73:—

Division.	Number of trees noted in working-plan.	Number of trees girdled.
Rangoon ...	12,000	12,015
Tharawaddie ...	20,000	20,117
Prome ...	6,000	6,000
Sittang ...	12,000	8,945
Salween ...	8,000	9,000
Total ...	58,000	56,077

In the Salween Division, an increase of Rs. 1,000 was sanctioned by the local Government.

In the Sittang Division, the deficiency to the extent of 3,055 trees in the number girdled is attributable to—

(*a*) Number girdled less than the complement for 1871-72 ...	1,445
(*b*) Suspension of girdling operations in 1872-73 by order of the local Government	2,000
	3,445
Less number girdled in excess, in 1868-69, 1869-70, and 1870-71	390
	3,055

The deficiency in 1871 is attributable in the first instance to the neglect of the late divisional officer to revise the work in the Koon forest when in progress, and secondly to the carelessness of the forest ranger, or his desire to defraud Government of a portion of the "girdling expenditure." Owing to the same cause, no care had been bestowed on selection of such trees as had been girdled, as many as 755 out of 1,734 being found to be unmarketable or undersized.

The Kauleya girdling operations of 1871 in the Rangoon Division also indicated inattention to details on the part of the Assistant Conservator in charge of the work.

Failures in girdling work.

(5). It will be seen that in both instances the failure was due to defective supervision, and in one, to the dishonesty also of the subordinate officer conducting the work.

As a check to the careless performance of the work, the rules provide that the permit-holder or other party employed in the forest should be invited to witness the selection of the trees; but it is evident, from the fact that in both the above cases the permit-holder's agents were either present or had every opportunity of being present, that a certain incentive is yet wanting to insure the selection of the trees being properly watched by parties whose interest, it is understood, would lead them to object to an improper selection.

Girdling procedure.

(6). It may not be out of place here to note briefly the procedure followed in the girdling work.

The forest ranger, charged as revising officer with the immediate control of the work, having collected some 15 to 20 coolies, establishes a camp as near as possible to the site selected. His party comprises the district forester or goungwai, two men hired as goungs to head the girdling parties, and a few peons. The work commences by the forest ranger conducting the whole party for several hours through one sub-division of the forest, in order to instruct them and satisfy himself that the work in all its details is thoroughly understood by all concerned.

Two separate girdling parties are then told off, the forest ranger taking charge of one, and the district forester the other.

Each party takes in hand a separate sub-division of the forest, and the work proceeds in the following manner:—

The goung leads, examining every slope, ridge, and spur, first on one side, then on the other, and marks with his dah and makes over to the girdling coolies all first class marketable trees which are possible of removal. He at the same time notes on paper or his bamboo reckoner the number of trees thus made over.

The girdling is performed by cutting a deep broad ring with axes through the sap-wood into the heart-wood to the depth of two or more inches. The ring or girdle thus cut is examined and finished off evenly with dahs, and care is taken to cut out whatever shreds of sap-wood may yet remain in the crevices, so as to insure a perfect severance between the sap-wood above and below the girdle.

The coolies, who, it should be mentioned, work in twos at each tree, then prepare with their dahs two flat marks, 6 inches square, on the heart-wood, one above and the other below the girdle.

This being completed, the forest ranger or district forester in charge of the party examines each tree, and if the work be found to have been properly executed, he brands it on both the flat marks with the "girdling" hammer, denoting the current year, and after noting the names of the coolies who performed the work, and the locality, allows the coolies to take in hand other trees.

As the work proceeds, the trees are blazed here and there, and cross sticks erected at the junctions of the spurs and other important points with a view to facilitate the subsequent examination of the tracts on the part of the superintending officer.

At the close of each day's work, the notes made by the forest ranger and goung are compared, and the results are entered in the daily work account—forms being supplied for the purpose—and in the sketch maps in course of preparation of each sub-division and of the whole district, as the work proceeds.

Before shifting to a new locality, the forest ranger revises the work of the district forester in places, to satisfy himself of its correctness. Before its close, the work is also inspected by the Deputy or Assistant Conservator as superintending officer.

Two or more of the tracts or sub-divisions noted in the daily work account and sketch maps are then selected and examined in the presence of the revising officer or district forester, and every tree counted to ascertain both the correctness of the entries in the daily work account and the manner in which the work has been performed.

The superintending officer at the same time holds valuation surveys to determine the proportion betwen the girdled trees and those passed over.

Should the permit-holder's employé or other party at work in the forest be present, he of course accompanies the goung to assist in the selection of the trees.

In the work of selection, however, the wishes of the permit-holder's employé or contractor are not always identical with the instructions issued to the forest subordinates.

The former prefer, as a rule, trees just up to the first class standard and easy of removal, and are inclined to pass over the trees of very large proportions as difficult to remove, as well as trees not likely to yield timber 25 feet in length and above.

The forest subordinates, on the contrary, have orders to kill every tree containing marketable timber from 18 feet length and upwards.

They are also not permitted to pass over any trees but what are specially exempted in the rules, and in the more remote forests they experience some difficulty in retaining the coolies if the selection is spread over too large an area. The coolies are paid at the rate of one rupee for every four or five trees, and hence it is their object to girdle as many trees as possible within the shortest time. The work is excessively trying, particularly in the hot weather, when the entire forest almost is leafless, and water has to be carried for several hours' supply at a time.

(7). Much has been advanced both in favor of and against the practice of girdling.

Objections of girdling.

The objections advanced against it are—(1) greater brittleness of girdled timber, loss of essential oil, and less breaking weight; (2) extra expenditure; (3) indifferent selection of trees by forest subordinates; (4) liability of girdled trees to burn and decay if left to stand for a considerable time; (5) its inutility as a protective measure for the conservancy of the forests. On the first of these objections nothing of a positive or definite character has yet been advanced as proof, the most opposite opinions having been expressed on all sides after a lengthened correspondence had been opened with parties both at home and in India in any degree likely to possess a knowledge of timber. As to the greater breaking weight of teak felled green, although this is borne out by most experiments, yet it remains to be seen whether the same results will be forthcoming in testing teak felled green and seasoned to the same extent as girdled timber.

The supposition that girdling occasions a loss of essential oil has been proved to be altogether erroneous, specimen pieces of girdled and green-felled timber having been tested by the Government Quinologist, Madras, and found to be equally rich in oil.

The second objection, if analysed, amounts to simply this, that an unnecessary expenditure of 6 annas on each tree, or about 4 annas per ton, is involved in the girdling; this is if the pay of forest rangers and peons is included; but if the pay of the superintending officer and his travelling allowance be added, the expenditure will amount to about 9 annas per tree, or 6 annas per ton. It may not be generally known, on the other hand, that timber felled green and allowed to season on the ground, being very liable to injury from the jungle fires after a few months, requires to be protected accordingly, and to be dragged out to some open spot or slope for exposure to the sun after having been deprived of the bark. This involves no little extra labour, especially on hilly ground, as green teak is about 66 per cent. heavier than seasoned teak.

The larger logs also require to be turned over occasionally to insure uniform seasoning, and this also entails additional elephant labour: taking these facts into consideration, it is certainly very doubtful whether any saving will be effected by adopting the practice of felling green.

The third objection is not altogether groundless, and undoubtedly instances can be cited of trees having been selected in places whence neither contractors nor permit-holders' employés have attempted their removal, the reason alleged being that the trees are too heavy and the locality too distant to work profitably. It must however be remembered that in the earlier girdling operations the plan was adopted of killing all trees exhibiting signs of decay, and hence a large number of unsound trees was girdled under the impression that it was right to utilize such timber, before rendered altogether useless by decay.

As to the selection not being always satisfactory, it will be obvious that where no trees have to be rejected which can yield marketable timber of 18 feet length, and contractors and permit-holders' employés find it more profitable to work out timber of larger length wherever procurable, exception will often be taken to the killing of such trees on the part of the Department, especially when a large portion of unsound wood has often to be cut off before a sound piece is obtainable.

As to the fourth objection, it cannot be pronounced a valid one, for the very obvious reason that girdled trees have no need to stand seasoning more than two to three years, and that if danger is apprehended from fire, all that has to be done is to remove the trees.

It is not, however, generally known that girdled teak trees are in no way impaired by exposure for upwards of seven or eight years, unless the gradual decay and loss of the sap-wood can be accepted as an injury.

In the matter of the fifth objection, *viz.*, the inutility of girdling as a protective measure in the conservancy of the forests, it has to be remembered that the difficulties experienced of late in dealing at the revenue station with illicitly-felled timber from certain forests in the Sittang division have resulted solely from the period of seasoning noted in the permits being reduced from three to two years, whereby the difference between "seasoned" timber available for extraction and "unseasoned" or illicitly-felled timber became, as a matter of course, less marked.

There is moreover every reason for believing that irregularities on so large a scale would never have been attempted in the Sittang division had not the parties concerned secured the connivance of the divisional officer, and felt assured that they would be allowed ample time and opportunity for fraudulently marking the illicitly-girdled trees and applying to them the process called "thonchoungtouk" and "puzoongnyat" to expedite seasoning, and occasion the entire separation of the bark within a period of one year instead of two years under the ordinary method of girdling.

Advantages of girdling.

(8). There can be no doubt that the first and foremost advantage in the girdling practice is, that it serves to a great extent as a safeguard against the importation of unseasoned timber into the market.

Complaints are rife in Rangoon as to the difficulty of getting good seasoned timber for local use except at the Government sales, and this is not to be wondered at when it is remembered that large quantities of half-seasoned timber are imported from the Burmese territory.

Another advantage is, that the girdled timber being about 66 per cent. lighter than green timber, can be transported with much less difficulty and floated much more readily down the shallow rocky channels which form the head-waters of the stream than would be the case with imperfectly seasoned timber.

The extraction of timber is also very much simplified in the case of girdled timber, the workpeople being able to take the timber by the most direct route from the stumps to the nearest stream and launch it there and then as one operation.

It may also be mentioned that in many forests the scattered condition of the first class trees, and the long distances the timber has to be dragged (sometimes 3 or 4 miles and even more) before it can be collected, preclude the formation of open depôts for the seasoning of timber prior to launching.

General results and conclusions arrived at.

(9). The results of the past five years show that the selection and killing of the trees for removal have not been satisfactorily executed in every instance, owing chiefly to gross neglect on the part of one superior officer, the dishonesty of his subordinates, and inefficiency of another executive officer, whose conduct was attended with more than ordinary consequences, as furnishing grounds for complaint on the part of the permit-holders of two forests.

These results make it clear that in future, instead of inviting the permit-holder or his agent to attend, it should be a rule that no girdling is to take place except in the presence of the parties who are interested in the extraction of the girdled trees; and, further, that girdling

should be undertaken immediately after the issue of a permit, to ensure the permit-holders having the prospect of benefiting by the work.

The difficulties experienced in dealing with unseasoned or illicitly-felled timber also suggest the following alterations in, and additions to, the existing girdling rules :—

(*a*). The branding of the trees to be effected at a height of 7 feet from the ground or 4 feet above the girdle, to ensure the preservation of the girdling mark in the event of it being necessary to fell the tree a little above the girdle.

(*b*). In addition to the number of the year, separate letters indicating separate subdivisions of the forest to be stamped on the girdled trees and noted in the girdling register.

(*c*). All timber extracted from the forest to be noted in the girdling register in additional columns, shewing its classification into girdled logs, top pieces, and dead or fallen timber.

These alterations will necessitate the enforcement of some simple rules in the working of the forest, *viz.* :—

(*a*). Trees to be felled without injury to the girdling mark.

(*b*). Top pieces to be always separated with cross-cut saws, and a definite mark affixed before extraction, in order to distinguish them readily from butt-end pieces.

(*c*). A distinctive mark to be affixed to all logs from dead or fallen trees.

(*d*). A report to be submitted by the permit-holder's agent or Government contractor, exhibiting the classification into girdled logs, top pieces, and dead and fallen timber.

These rules are extremely simple, and while entailing little or no additional work, will be found so to check the operations of both the workpeople in the forests and the action of forest subordinates and executive officers as to preclude a recurrence of the irregularities recently practised in the Sittang division, and remove all temptation on the part of Government contractors, even in the most remote and outlying localities, to infringe the rules.

With this system of check it would be unnecessary to extend the period from two to three years for the girdled trees to stand before removal.

Extraction of timber from the forests.

(10). During the past five years, *viz.*, between 1868-69 and 1872-73, the forests have been worked, as before, under the Government agency system and permit system, and with the following results :—

Under the Government agency system.

Divisions.	Logs.	Sleepers.	Tons.
Tharawaddie and Rangoon, aggregating about 1,025 square miles of teak localities	79,746	13,423	76,637·51
From the rivers and sea-shore as drift and waif	20,027	118	19,056·64
Total ...	99,773	13,541	95,694·15

Under permit system.

	Logs.	Tons.
Prome, Sittang, Salween, and north-east portion of Rangoon division, aggregating about 956 square miles of teak localities, and worked under triennial permits for the removal of seasoned timber only	123,116	94,458·1
Upper Salween forest and forests west of the Irrawaddie river, embracing an area of about 306 square miles of teak localities, worked under twelve and six years' leases, with the right to kill and remove all teak trees above 5 feet in girth measured at 6 feet from the ground	49,825	37,563·0
Attaran forest holdings and Pandaw forest (Salween division), estimated to cover 110 square miles, worked under leases of thirty years' duration, issued in 1867, and partly by annual permits for removal of dead timber	5,064	3,753·0
Total ...	178,005	135,774·1

Total outturn.

(11). From the above figures it will be seen that there has been a total outturn during the past five years of 277,778 logs and 13,541 sleepers, or 231,468·25 tons, equivalent to an annual yield of 46,293·65 tons from the entire forests of the province, estimated at 2,397 square miles in extent.

This outturn represents an annual yield of 19·31 tons per square mile, or 1·5 cubic feet per acre, in the following proportion :—

		Tons per sq. mile.
Government agency	Rangoon and Tharawaddie, excluding drift timber	
Permit system ...	Sittang	30·47
	Salween	17·17
	Prome	9·3
	Upper Salween and western forests ...	24·1

Comparison between outturn of the past and previous period.

(12). A comparison between the entire outturn and the outturn of the period of six years, 1862-63 to 1867-68, *viz.* :—

	Six years, 1862-63 to 1867-68.		Five years, 1868-69 to 1872-73.	
	Logs.	Tons.	Logs.	Tons.
Government agency	96,842	65,840·0	113,314	95,694·15
Permit system	171,584	124,886·7	178,005	135,764·1

exhibits an increase of 14,506·3 tons per annum in the following proportion :—

	Tons.
Under Government agency	8,165·5
,, permit system	6,337·8

The permit system.

(13). So many and diverse have been the opinions entertained with reference to the permit system that a discussion of them would be out of place in a report of this nature.

Hence the remarks noted here will be limited chiefly to the direct results of the system upon the revenue of the forests.

In consideration of the high rate of interest at which money had to be borrowed, the uncertainty attaching to the working of many of the more remote forests, and difficulty of procuring elephant labour, the rates at which timber had to be disposed of to permit-holders were fixed so as to leave a considerable margin for profit on good marketable timber.

For the forests west of the Irrawaddie the rates were exceptionally low, little or nothing at the outset being known of these forests beyond the fact that the teak was much scattered and in size and growth far inferior to the produce of other forests.

The early experience gained in the direct or Government agency system of working had also led to doubts being entertained as to the profitable working of many of the more remote of the upper forests.

People willing and fit to undertake the extraction of timber as contractors could not be readily obtained, and on several forests being worked with departmental elephants under supervision of overseers on monthly pay and receiving a percentage on the outturn, the results were not found to be very satisfactory.

This was in fact so generally known that on the introduction of the permit system the method of working almost universally adopted by the European permit-holders was one under which the extraction of timber was left solely in the hands of native agents, who were supplied with elephants and advances, and bound to dispose of the timber to the permit-holders at the ruling market price, the permit-holders recouping themselves by charging high interest on money advanced on the work and purchase of elephants, and obtaining the timber at generally lower prices than would be realized under fair competition in the open market.

As the working of the higher and richer forests was developed, the rates on permit timber were increased from time to time, and in 1870-71 were fixed according to girth on the running foot principle, the average amounting to 7 annas per cubic foot on logs 25 feet in length, above 3 annas per cubic foot on logs from 13 to 24 feet in length, and 1 anna per cubic foot on short pieces.

The rates on the western forest timber remained unaltered, the timber being small and the quality, even as late as 1871, generally inferior.

The average was 1 anna 2 pie per cubic foot.

Comparison between the results of permit system and Government agency system.

(14). Hitherto, in comparing the "permit" with the Government agency system, it has been customary to deduct the entire expenditure from the receipts in the case of each division; but as the main works of improvement, such as plantations, demarcation, &c., have been carried on of late chiefly in the divisions worked under the Government agency system, a correct estimate can only be arrived at by debiting the expenditure in the following manner :—

,, I. Timber expenses—entire in each case.
,, II. Purchase of stock—one-half under Government system, two-thirds under permit system.
,, III. Feed and keep of cattle—Government system half, permit system whole.
,, VII. Forest work : Girdling—entire in each case.
,, X. Communications : Blasting—entire in each case.

B. Establishment—
Direction—quota of half.
Executive—three-fourths.
Allowances—
Direction—quota of half.
Executive—three-fourths.
Contingencies—Nos. 1 to 5 inclusive.
} Same in each case.

The balance of the expenditure is debitable to the work of inspection, conservancy, and improvement of the forests, and cannot be fairly charged against the working of the forests.

By debiting the expenditure in this manner, the net profit accruing to Government on timber extracted during the past five years under these two systems is found to be—

		Per log. Rs. A. P.	Per ton. Rs. A. P.
Government agency.*	On doogees, 1st class (minimum length 30 feet, minimum girth 4 feet 6 inches.)	29 9 5	19 3 6
	Doogees, 2nd class	8 6 6	5 7 0
	Loozars, 1st class (length 18 to 29 feet, minimum girth 4 feet 6 inches.)	20 2 0	18 10 0
	Loozars, 2nd class	6 15 2	6 6 9
	Yatthits (18 feet and above, girth 3 feet and under 4 feet 6 inches.)	3 3 3	6 6 6

The above is based on prices realized in the open market, and makes no allowance for the high prices obtained occasionally on select timber sold on indent.

		Per log and per ton. Rs. A. P.
Permit system ...	Forests east of Irrawaddie — Doogees of every quality	7 9 8
	Forests east of Irrawaddie — Loozars „	
	Forests west of Irrawaddie—Doogees, Loozars, &c. ...	2 4 1 ₱ ton.

If allowance is made for interest at the ordinary rate of 12 per cent. per annum for eighteen months on the capital laid out by Government, the net profit is subject to a reduction of Rs. 4-10-10 per ton. Financially, the retention of the permit system will be seen to involve a considerable sacrifice on the part of Government.

It must be remembered at the same time that the forests retained and worked under the Government agency system being more accessible and nearer Rangoon, can be worked at a less cost than the mass of the forests hitherto allotted to permit-holders.

Thus, from the Government forests the simple cost of extraction amounts on an average to only Rs. 8-15-10 per ton, whereas from many of the divisions worked by permit-holders the cost varies from Rs. 10 to Rs. 14 per ton; but this excess is partly due to the fact that the permit-holders limit their operations chiefly to perfectly sound timber, the selection of which entails more expenditure.

Review of results of permit system.

(15). In reviewing the results of the permit system, it will be seen that although a considerable amount of revenue has been sacrificed, the Government has, on the other hand, been benefited by the opening up of large forests in a much more expeditious manner than would have been possible under an extension of the work with Government contractors, the higher remuneration offered by the permit-holders at the outset having had the effect of attracting men to the work from all parts of the province.

In behalf of the system it has also to be mentioned that one of its main results has been the raising up of a large body of men experienced in timber work, and introducing into the province the requisite number of elephants (several hundred in number) for developing the resources of the forests.

II.—The Survey and Examination of the Forests with reference to their Resources and the Growth of Teak.

Provisions of working-plan.

(1). Section 2 of the revised working-plan of 1868 provides for the careful survey and examination of different forest districts selected at the discretion of the Conservator, it being deemed desirable to obtain more information regarding the resources of each separate district, with a view to determining with more accuracy the number of trees to be killed annually, and revising the figures of the working-plan at the close of the first period of five years.

Another object in view was the separation of the more valuable from the less valuable forests as a preliminary step to demarcation of former as special reserves.

Both valuation and topographical surveys were prescribed, the former in some instances to be supplemented with a rough survey with prismatic compass and chain.

Results of survey and examination of the forests.

(2). At first, in 1868-69 and 1869-70, the work was carried on simultaneously in each division, and the results are, that the annual yield can be calculated separately for the following forest districts, instead of as formerly by applying to them the average obtained from the examination of the whole division :—

Division.	District.
Rangoon ...	... Thoongzai, east and west above Way village.
Tharawaddie ...	... Shwe-lai.
Prome ...	... Choung-zouk.
Sittang ...	... Bimbyai. Gwaythai. Myolha.
Salween ...	... Sinzway.

To the work of 1868-69 belongs also the examination of the Arrakan pynkado or iron-wood forests, which was accomplished by a Deputy Conservator (Dr. Schlich) temporarily deputed to that province.

* The average profit to Government on the entire outturn of the past five years, including short pieces, sleepers, and drift timber, amount to Rs. 10-10-1 per log, or Rs. 13-12-6 per ton.

In 1870-71, the rapid destruction of the teak forests in the Prome and Thayetmyo districts by toungya cultivation rendered it imperative that the demarcation of these forests should be promptly seen to.

To effect this object every available officer was withdrawn from other divisions, and the work of survey and examination of the forests concentrated wholly in the Prome division in the dry season of that year.

The result was the collection of data relative to the resources of the entire Eastern Prome forests, which will admit of very important alterations in the figures of the working-plan of 1868, in which the normal annual yield appears to have been considerably under-estimated.

In 1871-72, in accordance with the orders of the local Government, the topographical survey and examination of the cutch-producing tracts, both east and west of the Irrawaddie in the Prome and Thayetmyo districts, formed the chief work of the season. It was supplemented by similar operations being carried on in the Northern Tharawaddie district, both as regards teak and cutch-producing forests. In 1872-73 the topographical survey of the forests was suspended in accordance with the orders of the Government of India, but the examination of the cutch forests west of the Irrawaddie was continued. An additional and very important work accomplished in 1872-73 was the examination of the upper teak forests west of the Irrawaddie, in the Mattoon, Mudday, and Shwetanga districts, hitherto worked under a long lease of twelve years' duration, with permission to girdle and remove all trees 5 feet in girth and above.

These later operations had reference more to the separation of the valuable from the less valuable forests in the case of the cutch-producing tracts and similar tracts in the North Tharawaddie, while in the matter of the western teak forests, their object was chiefly to ascertain the result of the long lease system and resources of the upper teak tracts yet untouched.

In the case of the latter forests in the Mattoon and Shwetanga districts, the results shew the eastern and more accessible tracts to be now, with few exceptions, entirely denuded of marketable trees of and over 5 feet girth, and much injured by toungya cultivation, except on the outlying and steeper spurs.

The examination of the forests furnished the following information regarding their resources :—

District.	Estimated area. Square miles.	Teak trees above 5 feet in girth.
Mattoon ...	... 28	23,100
Shwetanga ...	... 5	5,000

Summary of linear survey work.

3. That the examination and survey of the forests with reference to the growing material have not been performed in a perfunctory manner, will be evidenced by the following summary of the results of these operations during the past five years :—

Divisions.	Areas traversed with linear surveys. Square miles.
Prome	23·65
Tharawaddie	13·23
Sittang	3·04
Rangoon	2·70
Salween	1·48
Total ...	44·10

Summary of results of topographical surveys.

4. The following is a summary of the results of the topographical survey work in the compilation of maps of the forests :—

PROME DIVISION ...

(1) Entire eastern Prome forests—area 1,342 square miles ; scale 2 miles to 1 inch.

(2) Western forests, Mattoon and Mudday districts—area 1,368 square miles ; scale 2 miles to 1 inch.

(3) Choungzouk and Gwaicho reserves—area 25·20 square miles ; scale 2 miles to 1 inch.

THARAWADDIE DIVISION

(1) Entire Tharawaddie division (in course of completion) east of Myetmakha river, embracing portion in the plains from Captain FitzRoy's map—area 2,052·5 square miles.

(2) Mokka Beeling special reserve (under compilation)—area 22 square miles ; scale 2 inches to 1 mile.

(3) Kangyee, Choungwa, Tsapoke, Choungnagoon, Tseetqueng reserves—total area 24·36 square miles ; scale 2 miles to 1 inch.

Rangoon Division ...	(1) Upper Paunglin forest—area 132·5 square miles; scale 2 inches to 1 mile. (2) Upper Thoongzai forest—area 194·5 square miles; scale 2 inches to 1 mile. (3) Kyekpyoogan block—area 4·63 square miles; scale 4 inches to 1 mile. (4) Oakkan and Magayee forests—area 59·25 square miles; scale 3 inches to 1 mile. (5) Fuel reserves on Prome road—area 13 square miles.
Sittang Division ...	(1) Myolha, Dounglankiar, Gway, and Gnakyat forests—area 97 square miles; scale 2 inches to 1 mile. (2) Bimbyay, and Gwaythai forests—area 56·5 square miles; scale 2 inches to 1mile. (3) Pyoonchoung reserve—area 5·49 square miles; scale 2 inches to 1 mile.
Salween Division ...	(1) Sinzway forest, Yoonzaleen district—area 14 square miles; scale 2 inches to 1 mile. (2) Beeling forest—area 10 square miles; scale 2 inches to 1 mile. (3) Doomdamee forest—area 44 square miles; scale 2 inches to 1 mile.

Cost of topographical survey.

5. The total expenditure incurred in survey work and compilation of maps during the five years under review was Rs. 51,493-5-7.

Data relative to growth of teak.

6. To ascertain the growth of teak, countings were occasionally made of the concentric rings on stumps; but the length of time required for the examination of even a single stump precluded much being done while valuation surveys were being held.

The results had to be supplemented with an examination at the Government timber depôt of the butt ends of logs from various forests.

They may be thus summarized:—

		Mean age at 6 feet girth.			
			Age at		
			18".	3'.	4' 6".	6'.
Tharawaddie.	(1) Tapoon in the plains: sandy alluvial loam	55 years.				
	(2) Padin-ben: low hills, hard stiff loam, sandstone near surface, underwood *Minwa*	153 „				
	(3) Bwet choung: light sandy loam, low hills, underwood *Kyathoung, Thikewa*	94 „				
	(4) Shwelai: low hills, light sandy loam, underwood *Minwa, Kyathoung*		25	57	98	152
	(5) Bobeit hills: sandstone		23	58	99	152
	(6) Toung Choung hills: do.		26	52	89	136
	(7) Mokka do. do.		26	57	89	139
Rangoon.	(1) Upper Zamayee hills: gravelly loam on sandstone ...		27	55	84	129
	(2) Lower Zamayee hills		17	45	76	115
	(3) Thoongzai upper hills: sandstone		26	54	77	107
Sittang.	(1) Myolha: undulating ground and low hills; underlying rock, sandstone, and laterite		24	52	81	142
	(2) Bimbyai Gwaithai: chiefly high ground and slopes, loam on decomposed laterite or granite		22	84	78	124
	(3) Kannee: ditto		22	42	67	108
	(4) Thoukyeaghat: soil chiefly loam on laterite and decomposed granite		22	51	77	118
	(5) Tsamoh in the plains; heavy loam on decomposed laterite ...		20	38	61	89
	(6) Moong: undulating ground, sub-stratum laterite ...		12	29	53	88

The following is a mean of the countings in each division, exhibiting ages at a girth of—

	1' 8".	3'.	4' 6".	6'.
Tharawaddie—hills	25	56	93	145
Rangoon—hills	23	51	79	117
Sittang—high undulating ground	20	43	69	111

III.—Improvement of the Forests.

The revised working-plan of 1868 provided for the improvement of the forests by—

I.—Plantations.

II.—Formation of forest reserves for protection and improvement.

Provisions of the working-plan relative to plantations.

(1). The plan proposed for forming compact masses of teak forest was the gradual planting up with teak of 10,000 acres in each of the three main divisions, *viz.*, the Rangoon, Tharawaddie, and Sittang divisions, by bringing 100 acres annually under arboriculture in each, or altogether about 350 acres yearly.

The sites were to be selected with due reference to soil and accessibility and facilities for transport of timber.

An important feature in the plan was the employment of hired cultivators, and the raising of such produce jointly with teak during the first and second year as would serve to give an immediate return, and thereby reduce the original cost of formation.

It was assumed that the expenditure might eventually be kept at Rs. 30 per acre for the first five years, but higher expenditure was anticipated at first, and a yearly grant applied for of Rs. 20,000.

Provisions of working-plan altered.

(2). In 1870-71, after the submission of a detailed progress report by the Conservator, and proposals for adhering to the system in force, the local Government, having regard to the formation of teak plantations where facilities existed both for supervision and procuring labour, directed the concentration of the work in the Rangoon division.

It was reckoned that 400 acres could be planted yearly, and the acres already planted maintained at a yearly cost of Rs. 30,000, or about Rs. 60 per acre.

Sites selected for aboriculture.

(3). The work at first was carried on simultaneously in the Rangoon, Tharawaddie, and Sittang divisions, the sites selected being—

Rangoon Division.—(1). *Kyekpyoongan,* on the Prome road, the east flank of the Pegu Yoma, here a ridge of considerable elevation, gradually sloping eastward into the source of the Bala, a tributary of the Pounglin river, and having on the west a mass of steep but low ridges and a considerable belt of teak.

Accessibility.—25 miles from Rangoon.

Soil.—A light sandy loam, shallow in parts, and resting upon a stiff ferruginous loam or disintegrated laterite, but deepening to the north-west and north.

Vegetation.—Heavy mixed forest of deciduous and moist forest trees in parts, elsewhere abandoned toungya clearings, densely covered with the usual over-growth: vegetation throughout generally vigorous.

Tharawaddie Division.—(1). *Boben Chungwa.* Low hills in the fork between the Boben and Thayet streams.

Accessibility.—11 miles east of Prome road, and 36 miles from Myanoung, the head-quarter station.

Soil.—A light but rich loam, shallow on the crests of the ridges, and of great depth on the slopes and in the ravines: sub-stratum chiefly sandstone.

Vegetation.—Deciduous forest with groups of teak trees of magnificent proportions, and an undergrowth of "kyathoung" and "tin" bamboo.

(2). *Kudin Beeling.*—Low hills on the right bank of the Beeling river.

Accessibility.—11 miles east of the Prome road, and 55 miles from Myanoung.

Soil.—A yellow and somewhat stiff loam of no depth on the crests and slopes, but deeper and richer in the hollows.

Vegetation.—Deciduous forest with an undergrowth of "tin" and kyathoung bamboo, and abounding in teak of excellent proportions.

Sittang Division.—(1). *Pyoon-choung.* High and undulating ground on the Pyoon-choung, north of the Thoukyeaghat stream.

Accessibility.—6 miles south-east from Toungoo.

Soil.—A dark loam of no great depth mixed with fragments of decomposed granite on the higher parts, and resting elsewhere upon a ferruginous sand stratum: in the lower part near the stream deep alluvial soil.

Vegetation.—Dry upper mixed forest interspersed with toungya clearings and belts of bamboo of tin and wapyooglay varieties, and containing a sprinkling of teak, chiefly of and below a girth of 3 feet, and varying much in growth: large teak trees scarce, but stumps to be met with.

Afterwards, on the concentration of the work in the Rangoon Division, a new site was selected instead of Kyekpyoogan, *viz.*:—

Magayee-choung.—On undulating ground and the banks of the Magayee stream.

Accessibility.—2 miles east of the Prome road, and distant by latter 57½ miles from Rangoon.

Soil.—Rich alluvial deposit near the stream, and dark loam varying in depth on the higher ground, and resting upon detritus of laterite and stiff ferruginous loam.

Vegetation.—Mixed forest of deciduous and moist forest trees, chiefly of large proportions, and indicating very vigorous growth; containing also a sprinkling of teak of fair growth.

Summary of results of arboriculture.

(4). The following is a summary of the results of the arboriculture during the period between 1868-69 and 1872-73 :—

Rangoon Division.

	Area planted with teak. Acres.	
In lower teak localities, *viz.* :—		
At Kyekpyoogan	683·5	825·5
At Magayee	142·	
Sittang Division.		
In lower teak localities, *viz.*, Pyoonchoung, Thoukyeaghat... ...		600·78
Tharawaddie Division.		
In upper teak localities, *viz.* :—		
At Boben Choungwa	255	341·
At Kadin Beeling	86	
Total ...		1,767·28

These areas, together with a small extension of the Prome experimental plantation (13 acres), represent an area of 356 acres, or ·55 square miles, planted annually with teak during the above period.

Experimental cultivation.

(5). The joint cultivation of grain and other crops with teak had for its object—

(*a*) A reduction in the cost of formation by sale of crops, fruit, &c.
(*b*) The partial shading of the teak plants during the hot season.
(*c*) A reduction in cost of weeding.

The experiment has been fully tested, and though not accomplishing the first of the objects in view, yet it may be said to have had partial success in many instances as regards shading the plants and lessening cost of weeding.

The various forms of joint cultivation attempted and their results are as follow :—

Hill paddy—Attempted on a large scale at the Boben Choungwa plantation, but failed, owing to the larger proportion of the seed when sown being devoured by rats attracted to the locality by the flowering of the bamboo.

These animals increase to such an extent on such occasions as to render cultivation of almost every description impossible, every device to exclude them from the clearings being utterly useless, consequent on the prodigious number which swarm into them at night. For this reason an extensive flowering of the bamboo is considered a very serious visitation by toungya cultivators, who are often reduced to great distress, and compelled to shift long distances in quest of fresh toungya grounds.

In the forest progress report for 1861-62, paragraph 8, it will be seen that the sparseness of population in the Upper Zamayee is attibutable to a visitation of this nature, but of such magnitude as to depopulate a large area of the hills now occupied by teak forest.

There are other objections to the cultivation of paddy with teak; when nearly ripe, the paddy plants are apt to be blown over and completely to cover up the teak seedlings, and hence it requires constant care on the part of the cultivator to free the latter.

The crop also requires careful watching at all times, and occasionally by night as well as by day, otherwise it is destroyed by game.

The difficulties connected with its cultivation are so great that this experiment was not repeated; it was moreover evident that no class of daily or monthly paid labourers could be induced to devote that constant and careful attention which is bestowed upon the crop by the hill cultivators, who, it should be remembered, are stimulated to great exertions from knowing that a failure in their crop involves the transport of paddy or rice long distances from the plains and loss of much time.

Cotton.—This had been tried with varying success in every division, but in no instance has the original cost of such cultivation been covered by sale of produce; the best results in this latter respect were obtained by the late Deputy Conservator in the Sittang Division, where, owing to proximity of the plantation to Toungoo, it was possible to sell the entire standing crop as it commenced to ripen, whereby the heavy expenditure usually incurred in the "picking" process was avoided.

Cotton is generally looked upon as so uncertain a crop that the hill cultivator seldom attempts to cultivate more than a small quantity in each clearing, unless the site is particularly favourable for it. Very careful weeding and loosening of the soil, as well as careful harvesting little by little each day as the pods ripen, are the obstacles to a profitable cultivation of cotton by means of hired labour: the hired cultivators, on the contrary, have the advantage of being assisted by their families, and being in a position to devote their spare hours to the work after undertaking other work giving a direct return.

Sweet Potatoe.—This was experimented with in the Kyekpyoogan plantation, and proved to be the most profitable crop for cultivation jointly with teak.

Its drawbacks are the large outlay required towards working the soil, which must be both rich and deep, raising the necessary mounds, transporting the crop to a suitable market, and obtaining a ready sale.

Its advantages are, that it secures a thorough working up of the soil and the suppression to a great extent of weeds, &c., thereby effecting a saving in weeding; but it is essential to success that there be a good depth of rich virgin soil. Over 1½ acre of such soil at the Kyekpyoogan plantation of 1870-71 as much as 4·37 tons of sweet potatoes were reported as obtained, which, at Rs. 57-12 per ton, realized the handsome sum of Rs. 252 against the outlay of only Rs. 84; over the remainder of the acres so cultivated, *viz.*, 58½ acres, the yield was only 18·02 tons, or ·3 tons per acre, equivalent to Rs. 19-4 per acre, the difference in yield being accounted for by inferior soil, partial shading of the teak plants, and theft of a part of the produce at night.

If labour could be procured, this would, in some localities having good deep soil, prove to be the most remunerative of the various systems of joint cultivation yet attempted, provided that the sweet potatoes could be readily disposed of in the Rangoon market.

Chillies.—The cultivation of chillies was only attempted on a small scale, it being evident from the limited demand that no profit would accrue from it, and no other object would be attained beyond the partial shading of the teak plants.

Ginger, plantains, pines, toorie, sesamum, coffee.—Experiments were also made to a small extent with ginger, plantain trees, and pineapple, toorie, sesamum, and coffee plants, but only the first gave a return slightly in excess of expenditure.

The coffee plants succumbed to the alternate dense shade of the teak trees in the rains and exposure during the dry season; at present an experiment with the sapan (*caesalpinia*) is being attempted at the Mogayee plantation; four acres have been planted, with the hope that in the course of five or six years the trees will be large enough to yield a large return when thinned out.

Cost and proceeds of experimental cultivation.

(6). The total expenditure incurred amounted to Rs. 4,560-13, and the receipt by sale of produce to Rs. 2,865-12-9.

General results of experimental cultivation.

(7). Although financially a failure, yet the series of experiments which have been made have not been without good results in throwing considerable light on the question of reducing the cost of teak plantations.

They shew that generally labour and supervision are so expensive that remuneration can only be looked for in the case of the sweet potatoe or ginger, if cultivated on a light but rich soil of good depth.

The drawback is that these plants do not afford shelter to the teak seedlings, and that there may be a difficulty in finding a ready sale for the sweet potatoe crop, except at a reduced price to persons contracting to supply ships in harbour, as was the case formerly.

In the matter of the sapan experiment, it would be premature to express an opinion until the second or third year.

It was undertaken at the suggestion of Mr. Slym, the Deputy Conservator, Maulmain, who drew attention to the high prices realized by sapan wood at Singapore, *viz.*, Rs. 3 per 100lb, and estimated that if planted out in rows 6 feet by 4 feet, the trees at an age of five or six years would give a return of several hundred rupees per acre.

The former experiment with sapan in 1866-67 failed apparently in consequence of the inner range of hills at the Prome plantation being too dry, and having an insufficiency of soil.

A small experiment was also made with bamboo of the better varieties with a view to the early suppression of the undergrowth, and having a light uniform shade around the teak saplings. The overflow of the Magayee stream destroyed most of the plants, and the results further shewed that bamboo seedling are better adapted to an experiment of this sort if obtainable of a sufficiently large size.

General results of teak cultivation.

(8). The total amount expended on teak plantations during the past five years is Rs. 1,38,320-3-8.

This represents the cost of a yearly extension over 353·45 acres, amounting in all to 1,767·28 acres, and of the maintenance of this area and of 251·37 acres planted before 1868.

The planting therefore of 353·45 acres annually and maintaining the same to the fifth year has been accomplished at a cost of Rs. 24,500 yearly, or about Rs. 70 per acre, inclusive of amount expended on experimental cultivation.

In the working-plan of 1868 it was estimated that the expenditure for formation and maintenance for five years, calculated on the results of the early experiments in the Sittang Division, could be kept down to Rs. 30 per acre; but higher expenditure was anticipated at the outset, and hence an annual grant of Rs. 30,000 was solicited subsequently, as already mentioned in page 22. The local Government estimated the cost of Rs. 60 per acre, it being apparent that the execution of the work over larger areas involved additional expenditure, owing to the necessity for marking off the plantations into regular compartments, forming roads to facilitate supervision, employing an establishment for control purposes, and adopting systematic measures to afford protection against fire.

Another cause of increased expenditure was, that the Department was forced to have recourse to daily and monthly-paid labourers, owing to Shan cultivators not being obtainable in sufficient number for the adoption generally of the hired cultivator system, although to secure this latter class of labourers sites were selected in the most accessible places (such as Kyekpyoogan, selected by Dr. Schlich, near Rangoon, and Pyoon Choung near Toungoo), and where proximity to the plains would enable the cultivators to dispose readily of their crops.

In the case of daily and monthly-paid labourers, the wages were 8 annas per diem and Rs. 12 per mensem, whereas the "hired cultivator" system was at first believed to involve an expenditure for formation of only Rs. 10 per acre, *plus* exemption from capitation-tax Rs. 2 per acre, and cost of teak seed Re. 1 per acre, making a total of Rs. 13 per acre.

Eventually, as other descriptions of work were found to be more remunerative, the Shan settlers raised their demands, and many of them preferred employment under Public Works Department contractors on the Prome road.

The results of the past five years shew the cost of formation in light forest and maintenance for four years under the Shan or hired cultivator system to be not less than Rs. 46-4 per acre.

Under the direct or daily and monthly-paid labour systems, the cost cannot be estimated at less than Rs. 90 per acre.

The Shan cultivators having now increased from 14 (in 1868) to 217 (the present number), there is consequently every prospect of the work being carried on in future at a cost of Rs. 63-12 per acre.

In the revised working-plan, it is estimated that on one acre of a well-stocked teak plantation there will be—

At the age of	15	years	...	350 trees in girth	18″
„ „	55	„	...	90 „	4′ 6″
„ „	80	„	...	60 „	6′

from which the yield would be—

At 80 years,	60	trees	containing about	50	c. feet each, or	3,000	c. feet of marketable timber.
At 60 years,	30	trees	„	25	„	750	„ „ „
			as a total of		...	3,750	cubic feet,

or an average annual yield of 47 cubic feet, excluding the yield of the thinnings prior to the age of 60 years, which will go to cover maintenance after five years.

If the net profit be calculated at Rs. 35 per ton, the yield of one acre will be equivalent to Rs. 2,625.

The principal which will realize this sum after 80 years, with compound interest at 5 per cent., being Rs. 52·9, it will be seen that plantations are being formed at considerably above the cost at which they could be looked upon as really remunerative to Government.

It must be mentioned also that it is doubtful whether the Shan cultivators will continue to work, as operations are extended more eastward into the hills from the present site of the Magayee plantation, which is about 2 miles above the Prome road.

Hence, if regular plantation work is to be continued, it will be absolutely necessary to import a cheaper class of labourers from Behar or elsewhere, and in addition undertake the cultivation of the sweet potatoe jointly with teak in places where soil of the required depth and quality is to be had.

Experimental cultivation of chinchona.

(9). In 1868, prior to which only two plants had been successfully put out at Bogalay, the cultivation of "chinchona" was definitely sanctioned by Government, and arrangements were made for two Karen lads to undergo a course of instruction in chinchona cultivation at Ootacamund. A site was also selected at Plumadoe on a feeder of the Myetgnan, at an altitude of about 2,200 feet and some three days' march from Toungoo, by Mr. Kurz, Curator of the Herbarium Royal Botanic Gardens, Calcutta.

The Conservator accompanied the Karen lads to Ootacamund, and brought back some 200 seedlings of the *Succirubra* variety, of which 188 were successfully set out at Plumadoe at the close of the year.

In 1869, Government having directed the selection of a site at a greater altitude, an area of 100 acres was taken up on the Thantoungyee range at 3,800 feet elevation, between the Thoukyeaghat valley on the east and the source of the Pathee Choung on the west, and distant about 18 miles north-east from Toungoo.

At this site operations were commenced early in 1871, with seed obtained from Ootacamund on the return of the Karen assistants from that place; but owing to a suspension of the work pending a reference to the local Government, regarding the claims of some Karens of the Bghai tribe to the land in question, the experiments with seed entirely failed. A further supply of seed was obtained, but only 60 seedlings were raised: about this time also the most intelligent of the Karen assistants died of jungle fever.

The work of propagation was confined wholly to cuttings until the rains of 1871, when a large number of seedlings was obtained from seed supplied by the Superintendent, Chinchona Plantations, Darjeeling.

Further supplies of seed were obtained from thence and Ootacamund, and the result up to date is that 8,000 seedlings of *Succirubra*, *Calisaga*, and *Coudaminia* varieties are now in hand at the Thantoungyee site, of which about 5,000 have been put out in the rains of 1873. In addition to this work, propagation by cuttings was carried on at the Thantoungyee plantation, which by the close of 1872-73 contained 522 well-established plants.

Similar work was carried on at Plumadoe before the concentration of the work at Thantoungyee, and the original number of plants, in which 52 failures in all occurred, was increased thereby to 240. The original trees now vary from 6 to 12 feet in height. Some commenced to shed seed in 1872.

The two plants set out at Bogalay in 1866 are about 11 to 13 feet in height respectively, and commenced to flower in 1871.

Specimen pieces of bark from these two trees and some of the larger ones at Plumadoe have been recently analysed by the Government Quinologist, Madras, and found to yield the following percentages of alkaloids in 1,000 parts of dry bark:—

	Plumadoe.		Bogalay, 2,800 feet.
	Lower site, 2,200 feet.	Upper site, 2,300 feet.	
Total alkaloid	4·23	4·29	3·13
Quinine and quinicine ...	1·18	0·32	0·98
Cinchonine and cinchonidine ...	3·05	3·97	2·15
Pure quinine sulphate obtained crystallized ...	0·49	0·27	0·56
Cinchonidine sulphate ...	1·05	1·75	0·73

The barks (*Succirubra*) were thus proved to contain a satisfactory amount of alkaloid, but very little quinine sulphate, and to be only suitable for local use as a febrifuge, a result which might have been anticipated from the low elevation of Plumadoe and Bogalay.

The establishment has comprised—

	Rs.
1 Trained Assistant at Rs. 40, recently increased to ...	50
2 Assistants under instruction, at Rs. 9	18
4 Peons or gardeners, at Rs. 10	40

involving a fixed monthly expenditure of Rs. 108.

The total expenditure on the chinchona experiment up to close of 1872-73 was Rs. 7,684-10-5.

Experimental cultivation of caoutchouc.

(10). In the dry season of 1872, seedlings of the *Ficus elastica* were procured with the assistance of the Political Agent, Mandalay, from Upper Burma, and set out in the Prome and Magayee plantations. Those in the former succumbed to the protracted heat of the dry season of 1873, after being apparently well established; but the remainder at the Magayee plantation made good progress, and have continued to exhibit very healthy and vigorous growth. By means of cuttings the number of plants has been increased from 6 to 30, all of which are doing extremely well. Arrangements have recently been made to obtain a large number of seedlings from the forests north of Bhamo, and an officer of the Department has been deputed to visit the locality, with a view to gaining the requisite information preparatory to the experiment being continued on a large scale.

Formation of Reserved Forests for Protection and Improvement.

Areas demarcated as special reserves.

(1). In accordance with the provisions of the working-plan, the following areas have been finally demarcated as special reserves, with the sanction of the local Government:—

Tharawaddie Division.

	Acres.	Square miles.
Mokka	7,200	
Beeling	6,880	
Total	14,080	22·
forming one block on the hills between the Mokka and Beeling streams.		
Choungwah, on the hills at the fork between the Boben and Thayet streams		1·16
Kangyee, in the plains between the Boben and the Moyar, a feeder of the Mimboo		5·93
Bwet Choung, hills contiguous to the plains and the Shwé-lai river ...		4·51
Shaboung, high undulating ground near the Shwé-lai, Shaboung, and Toungnyo watersheds		3·48

Salween Division.

Sinzway, high ground and hills west of the Yoonzaleen river	14·
Moo choung, Wahmoo choung } High ground and hills east of the Yoonzaleen ...	6·18

Prome Division.

Gwaycho, on the western extremity of the Tsa-yea Kyaw, or watershed between the North Nawing and Choungzouk streams... ...	10·5

Rangoon Division.

Kyekpyoogan, 25 miles from Rangoon } Taken up for teak planta-	
Magayee, 53½ „ „ „ } tions	1·29

Sittang Division.

Pyoon choung, high ground north of the Thoukyeaghat, a large tributary of the Sittang river	5·49
Total ...	74·54

(2). In the selection and demarcation of the forests for protection against toungya cultivation as ordinary reserves, the following progress was made :—

Demarcation of areas for protection.

Division.	Areas surveyed and mapped—proposals under consideration. Square miles.	Areas sanctioned as ordinary reserves and finally demarcated. Square miles.
Prome—Containing teak and other valuable trees...	367·28	18·67
Cutch only	84·3	0·
Tharawaddie—Teak and other varieties for fuel purposes...	28·8 10·9	42·38 0·
Salween—Teak and other varieties ...	58·25	0·
Sittang	0·	0·
Rangoon—Teak, &c., for fuel purposes	4·76 13·09	0· 0·

The fuel tracts (23·99 square miles) were approved of, and their demarcation only delayed pending a rectification of boundaries.

In the case of the Prome tracts, their large area precluded an early decision being arrived at by the civil authorities.

Work of improvement provided in working-plan.

(3). The work of improvement set forth in the working-plan for special reserves, when finally demarcated, comprised—

(*a*) The cutting of creepers.

(*b*) Improvement of growth of young teak by pruning of double stems, cutting down bamboo and small trees which overtop young teak, and clearing away heavy inflammable matter.

(*c*) Assistance to reproduction by sowing with seed blank places caused by the flowering of the bamboo.

(*d*) Protection of limited forest tracts against fire.

Cutting of creepers.

(4). The first of the operations was carried on over the entire Sinzway, Moo, and Wahmoo Choung rerserves, Salween Division, embracing an area of 20·18 square miles. In the Tharawaddie and Prome reserves, the rule has been enforced of having creepers cut by the district foresters along the lines frequented by them, no officer being available for the control of the work on a large scale.

Improvement of growth of teak.

(5). The second of these operations, which also needs careful supervision, was for similar reasons not undertaken as a regular separate work.

Resuscitation of the teak forests.

(6). The fourth description of work to aid the reproduction of the forests in the places where the bamboo had flowered was tried in the Boben Choungwa reserve; dead bamboo clumps were fired, and the ground thus cleared thickly sown with teak seed early in the rains.

The seed germinated freely, but not in such profusion as to suppress all undergrowth, and the result shewed that periodical weeding was necessary in most places to insure success.

There being no very recent flowering of the bamboo in most of the more accessible reserves, every effort was made to improve the natural reproduction in such reserves with the aid of hill or toungya cultivators.

This method of regenerating the forests was first suggested by Dr. Brandis in 1857-58, then Superintendent in this province.

In 1862 and the subsequent year every effort was made to induce the Karens to undertake the cultivation of teak jointly with their crops in toungya clearings in the Prome and Tharawaddie Divisions; but with the exception of a few acres in the latter division, more by way of reparation for trees found destroyed, the attempt may be said to have failed, as the mass of the Karens either refused, on the ground of superstitious, prejudices, or openly declined, alleging as a reason that by such a course they would be assisting in their own expulsion from the hills and depriving their offspring of means of subsistence.

In 1868 the attempt was renewed, and finally in 1869, when the demarcation of the Mokka Beeling was undertaken, several leading men were induced by the Conservator to make the experiment, it being explained to them that the sooner considerable areas were formed into more or less compact blocks of teak forest, the sooner would the Department be in a position to abandon large areas wholly to the Karens as their toungya grounds. It was at the same time deemed politic to reward the leading Karen in the Mokka by giving him timber work and supplying him with elephants under the usual terms.

The conditions under which the work was undertaken were—

(*a*) Exemption from capitation-tax.

(*b*) Payment at Rs. 10 per acre covered with teak at 6 feet by 6 feet distances.

(*c*) Trees to be protected also from fire and kept clear of weeds during the second and third seasons, at Rs. 5 per acre per annum.

The last of these conditions proved very irksome, and had to be wholly abandoned, the Karens finding it impossible to look after the previously planted areas simultaneously with their new clearings.

In the Salween Division (Sinzway reserve), a commencement was also made with the aid of the head Karen, who was appointed to the charge of the reserve as district forester.

The experiment was also commenced in the Kangyee, Thitcho, and Choungwah reserves in the Tharawaddie with the aid of Yabines (or silk cultivators), but with the exception of the last of these reserves the results were not satisfactory.

The success attending the work in the Mokka Beeling reserve had the effect of convincing and winning over the most sceptical of the Karens; and as the final demarcation of the Mkoka Beeling block was in 1871 a *fait accompli*, others were induced to take to the work, and ultimately the remainder of the Karens of the Mokka hills moved into the reserve under agreement to cultivate in uniform blocks on the slopes having soil suitable for cultivation and under departmental supervision.

In the Prome Division similar work was undertaken by Chin squatters in the Gwaycho reserve, but the results were unsatisfactory, and shewed that such people should never have been admitted into the reserves except with the distinct understanding that cattle were to be confined to certain areas.

The results up to date of the employment of hill cultivators for the improvement of reserves may be thus summarized :—

Tharawaddie Division.

	Acres.	Areas covered with teak seedlings, averaging 400 to the acre. Acres.
Mokka Beeling Reserve—		
Up to 1872	53	191
In 1873	138	
Minlha (proposed) Reserve in 1873 ...	...	75
Boben Choungwa—		
Up to 1872	11	17
In 1873	6	
		283

Salween Division.

Sinzway Yoonzaleen—		
Up to 1872	60	80
In 1873	20	
Total ...		363

Protection of areas against fire.

(7). The work of protecting limited forest tracts against fire was commenced as soon as the final demarcation of several of the reserves had been effected.

In 1873 it was carried on in the Tharawaddie, Salween, and Prome Divisions, but failed entirely in the latter.

The following are the results of this important work, the planted areas protected prior to 1870-71 being excluded :—

	Areas taken in hand.	Areas successfully protected.
In 1870-71	1,521	1,251
In 1871-72	10,791·0	10,791·0
In 1872-73	27,876·3	17,117

The expenditure on these operations amounted to Rs. 4,985-13-6.

The failures occurred chiefly in the Prome Division, and to a small extent in the Tharawaddie and Salween Divisions.

In the Prome Division the width of the fire-paths was only 15 feet, but the divisional officer attributed the failure to incendiarism or carelessness of people passing through the reserves.

The constant traffic through the Kangyee reserve occasioned the main failure in the Tharawaddie Division.

IV.—Duties of Forest Rangers and Foresters or Goungwais.

The duties laid down in the working-plan were classed under—

(*a*) Protection of the forests.
(*b*) Working.
(*c*) Improvement.

Employment of forest establishment.

(1). The first of these duties related to protection against toungya cultivation and infringement of the forest rules.

Breaches of forest rules discovered.

Frequent periodical inspections of the forests have been enforced on the part of these subordinates, and the following results testify generally to their activity and the efforts of the controlling establishment during the past five years to protect the forests and give effect to the forest rules :—

Divisions.	Number of Prosecutions.	Number of Persons.	Convictions obtained. Number of Cases.	Convictions obtained. Number of Persons.
Rangoon...	3	3	3	3
Tharawaddie	18	24	18	20
Prome	98	164	65	94
Sittang	3	3	2	2
Salween	100	124	85	111
Total ...	222	318	173	230

In addition to the above, 13 cases of breach of permit conditions relating to the working of the forests were discovered and dealt with during the past five years, the result being the forfeiture of 11 permits and confiscation of altogether 6,355 logs. The greater portion of timber, *viz.*, 6,235 logs, had reference to the extensive breaches of rules in the Sittang Division, for the discovery of which but little credit is due to the subordinate grades, although under the circumstances (the divisional officer personally conniving at irregularities in the forests) no other result could have been expected.

In connection with the working of the forest, their duties had reference to the marking of timber, girdling operations, and examining and reporting on extraction of timber.

In these duties the subordinates have been chiefly employed, and considering the class of men procurable for the low rate of pay fixed for foresters, Rs. 10 per mensem, and the character and extent of the teak-producing forests, the results have been on the whole satisfactory.

At the outset the pay was doubtless commensurate with the work expected from the Goungwais; but within the last few years their duties have become so multifarious, and their responsibilities have so increased, as to render it extremely difficult to obtain efficient and reliable men for the small salary allowed.

The position of the forest rangers has been considerably improved by increased rates of pay and additional appointments sanctioned in 1869, but still their number is far short of what is required for a thoroughly effective control of the forests, particularly since the demarcation of large areas as special reserves.

The work of improvement laid down for forest rangers and foresters comprised, on the part of the latter, the cutting of creepers and jungle trees and bamboo, overtopping teak seedlings along the roads and pathways through the forests, and the collection of teak seed; while on the part of the forest rangers it embraced the general control of the foresters' work, and the management of works of improvement in the natural forests wherever and whenever their services could be spared.

As a rule their other duties, connected with girdling and the general working of the forests, have occupied so such time as to leave but little time for systematic effort in works of improvement, which, it has to be remembered, need European supervision, equally with other matters entrusted to native subordinates.

The work of improvement contemplated had chiefly for its object the employment of the forest subordinates when not otherwise engaged; the results shew conclusively that such work should constitute the duty of an almost separate and distinct establishment, wholly freed from other duties connected with the extraction of timber, protection, &c., &c.

Controlling establishment.

(2). The results obtained in the enforcement of the forest rules are in a great measure due to the activity of the controlling officers, it being obvious that with the large areas to be inspected and difficulties connected with detection of offences, much depends on the personal efforts of the controlling officer and the direct interest he takes in the enforcement of the forest rules and the work of his subordinates. The withdrawal of almost every available officer for demarcation work will explain the small results obtained in the actual improvement of the forest beyond the work of planting. That the duties performed are generally of a trying nature, involving considerable exposure, is evidenced by the fact of three casualties having taken place in the controlling staff within the last six years.

Financial results and general working of the Department with reference to the future.

The following figures exhibit the expenditure, receipts, and net revenue of the Department during the past five years:—

	Receipts.			Expenditure.			Net revenue.		
	Rs.	As.	P.	Rs.	As.	P.	Rs.	As.	P.
1868-69	8,17,911	11	5	4,23,129	4	5	3,94,782	7	0
1869-70	9,84,875	11	4	4,15,381	15	3	5,69,493	12	1
1870-71	8,18,124	4	0	4,00,035	7	9	4,18,088	12	3
1871-72	7,72,399	9	8	3,78,450	6	1	3,93,949	3	7
1872-73	8,27,568	13	7	3,36,197	12	4	4,91,371	1	3
Total ...	42,20,880	2	0	19,53,194	13	10	22,67,685	4	2

Comparing these figures with those of the previous period of six years noted in page 8, it will be seen that the net revenue of the Department during the past five years has increased from Rs. 2,32,500 to Rs. 4,53,537, involving an average increase in the annual net revenue of the Department of Rs. 2,21,037 over that of the period between 1862-63 and 1867-68.

Review of the period between 1868-69 and 1872-73.

The general results of the past period of five years may be thus summarized:—

I.—The General Working of the Forests.

Fifty-six thousand and seventy-seven first class trees have been girdled in the districts noted in the revised working-plan, and an outturn obtained from the forests to the following extent:—Under the Government agency system 95,694·15 tons, and under the permit system 135,774·1 tons, or a total of 231,468·25 tons, equivalent to an average yearly outturn of 46,293·65 tons, or 14,503 tons in excess of the average yield extracted during the previous period.

II.—Survey and Examination of the Forests.

The resources of 44·10 square miles have been determined by valuation or linear surveys, and a total area of 4,027·43 square miles topographically surveyed, these results admitting of a revision of the figures of the working-plan relating to a total area of 1,981 square miles.

III.—Improvement of the Forests.

A total area of 1,780 acres have been covered with teak, or on an average 356 acres yearly, at a cost to the State of about Rs. 70 per acre.

Formation of special reserves for improvement.—An area of 74·54 square miles has been finally demarcated, and over 20·18 square miles the trees have been freed from creepers.

In three reserves the planting up of blank places to the extent of 363 acres has been successfully carried out with the aid of hill cultivators.

Demarcation of reserves for protection.—An area of 61·05 square miles has been finally demarcated, and proposals have been submitted for 562·62 square miles after being carefully examined, surveyed, and mapped.

IV.—Conservancy and Control.

Breaches of forest rules aggregating 258 cases have been discovered, of which 186 were brought to a successful issue, involving fines to the extent of Rs. 6,089 and confiscation of altogether 6,355 logs or pieces.

V.—Financial Results.

The expenditure under B. Establishment has increased from Rs. 61,823 to Rs. 99,732 per annum, consequent on a larger proportion of officers on higher rates of salary.

The average annual receipts exhibit an increase of Rs. 1,73,285 as compared with those of the previous period.

The average annual net revenue also exhibits an increase to the extent of Rs. 2,21,037 over and above the figures of the previous period.

The Department having recently taken up the extraction of wood of the varieties known as thitka and thitkadoe, recently conserved by order of the local Government, and for which a demand has sprung up and provision being about to be made to extend conservancy to a large number of valuable trees, a steady advance of the revenue of the Department may be anticipated.

W. J. SEATON, *Captain*,
Conservator of Forests.

Memorandum by Captain W. S. Seaton, *Conservator of Forests, British Burma,—dated Prome, the 28th February* 1874.

The proposals of the Officiating Inspector General of Forests, as noted in paragraph 2 of the report of 1873 on the forest system of British Burma, have reference to—

(1) Constitution of the forest area, or formation of ordinary, special, and district reserves.
(2) The treatment of forests and revision of the working-plan as regards those managed by the Forest Department.
(3) Improvement of forest establishment, and systematizing their employment and duties.
(4) Working of the forests under the permit system.

2. I will proceed to explain briefly and note my opinion on these proposals in the above order.

I.—Formation of Ordinary, Special, and District Reserves.

(*a*). *Ordinary Reserves.*

3. These to be limited almost wholly to the hilly region between the eng or *Dipterocarpus* forests and the Yomas, portions of the eng forest being included, where its denudation is threatened, within these limits; considerable areas to be excluded for the toungya cultivation of the Karens on either side of the Pegu Yoma and of the Chins near the Arracan Yoma. The object in view is primarily to preserve the higher forests for climatic consideration from toungya cultivation, and secondarily to protect and maintain the bulk of the present teak-yielding area in an efficient state, pending the formation of compact forests of teak and other valuable trees in the special reserves. Another object is to extend protection to the more valuable trees, by regulating the size of the trees to be felled, and method of utilizing many descriptions of forest produce now obtained in the most improvident and wasteful manner; and further to control the extraction of minor forest produce other than grass and bamboo, which, together with the less valuable trees, are to be left free for the use of persons collecting them.

Position of ordinary reserves.

Areas for the hill population excluded.

Object of the ordinary reserve.

These proposals are almost similar to those submitted by me in 1870-71, and approved of by the local Government in No. 582-4F. of 28th September 1870, for the formation of large block reserves near the Yoma, and the demarcation within them of certain areas for the cultivation of the Karens.

Identical with the "block reserve" system.

The proposals therefore of the Inspector General will, I need hardly add, provide fully for the protection of the higher forests.

As will be expained hereafter, the suspension of the forest rules within the areas demarcated as toungya grounds near teak localities, should, in my opinion, be conditional on the Karens assisting in works of improvement, such as planting up blanks in the special reserves and protecting the higher forests from fire.

Advisable to delay abandonment of conservancy in Karen toungya lands pending arrangements with Karens.

(*b*). *Special Reserves.*

For special reserves it is proposed to take up compact areas of existing forest of very best growth or areas, having an excellent soil and exposure, the sites thus selected being either within or without the ordinary reserves in the five main forest divisions, and aggregating some 250 to 300 square miles in area.

Position and selection.

If closely stocked, this large area would give a yearly outturn of teak equal to the average annual yield of the British and foreign forests during the last six years; but if blanks and portions of the reserves on which other valuable trees will thrive best are taken into consideration, this estimate will appear altogether too favourable, and 300 square miles will not be too large an area to take in hand.

As mentioned by the Inspector General, the enormous area over which the teak-producing forests are spread, and their unsatisfactory condition by reason of the periodical fires and toungya cultivation, all point to the urgent need of regenerating the forests, by taking up limited areas in the best localities and devoting our whole energy to them towards forming compact forests.

Object of special reserves.

In the revised working-plan of 1868, the attention of the Forest Department was drawn to the selection of tracts for demarcation as special reserves, and some progress has been made in this direction in the Tharawaddie and Prome Divisions; but the present proposals of the Inspector General urge the formation and systematic treatment of special reserves as the keystone of all future forest improvement in this province.

Some progress made in selection of special reserves.

It is understood that the special reserves here referred to are exclusive of those already selected or about to be selected as cutch reserves and fuel reserves.

(*c*). *District Forests.*

These, as proposed, will comprise the more valuable forests yet existing in the plains and lower hills below the line of eng forest, and will embrace also strips of forest fringing the streams and roadsides and groves near zayats and pagodahs.

Position and selection.

In their selection, which will rest with the civil district officers, due regard will be had to the formation of new villages and spread of cultivation without ignoring the wants, as regards forest produce and grazing grounds, of existing villages.

It is suggested that these forests be placed under the control of the subordinate revenue officials or village headmen, and a system be adopted of regulating the extraction or use of forest produce in them on the part of the people, so as to insure a continuous supply; and further to check altogether the destruction of the more valuable trees now being indiscriminately removed for purposes of sale to distant markets, a system of leases being introduced where practicable, and the revenue thus realized devoted to planting valuable trees to meet the demand for house posts and timber for planking.

To be controlled by civil officers.

Recently a scheme for the protection of the more valuable trees on the part of civil district officers, and *gradual* formation of district forests, was adopted by the Revenue Bill Committee and approved of by the local Government.

District forests already sanctioned.

The formation of district forests has thus been decided upon; but the Inspector General recommends that this important work should be promptly taken in hand, there being a tendency to overlook the fact that after population has been allowed to spread, the task of apportioning forest areas to meet their wants will be most difficult, if not altogether impossible, except at great expense.

Delay in selection of district forest reserves deprecated.

It certainly appears that an early selection is absolutely necessary of the tracts to be set apart in future as district forests, otherwise there will be but little forest left to select from in the plains.

II.—Treatment of the Forests, and Revision of the Working-plan as regards those managed by the Forest Department.

(*a*). *Ordinary Forest Reserves.*

Treatment for ordinary reserves.

4. The treatment proposed by the Inspector General for the ordinary reserves has in view—

(1). The maintenance of the supply of teak for the market during the progress of the work in the special reserves.

(2). Protection against fire wherever practicable, and altogether against toungya cultivation.

(3). Liberation of a large staff employed hitherto in the selection of trees to be felled.

To effect these objects the following working-plan, almost identical with that suggested by Dr. Schlich in 1868, is proposed by the Officiating Inspector General :—

Working-plan of ordinary reserves.

5. Group all existing teak localities in each forest division, including those not reserved, but exclusive of the special reserves, into 10 blocks, and divide each of these blocks into 10 compartments for a clear felling annually of all first class trees, the blocks and compartments to be arranged not according to areas, but on the data now available regarding the position of the first class trees and those which will attain that size, so as to insure on an average an equal number of first class being available yearly in each compartment.

All check on the part of the Forest Department to be limited to the passing of timber of the standard size and top pieces at the revenue station.

Reduced standard girth.

6. It appears that on re-consideration the Inspector General is disposed to recommend that the minimum girth of the trees to be felled be fixed as low as 5 feet.

7. The above is an outline of the proposed system of working the forests without the limits of the special reserves.

Practicability of working-plan.

8. I now propose to note my opinion as to—

(1). The practicability of this system.

(2). Whether its adoption is advisable from a conservancy point of view.

In the first place, with regard to its practicability, I presume that no difficulty will be experienced in dividing the teak-producing tracts in each division into ten blocks, as mentioned above; but with the exception of the Eastern Prome forests, in which numerous valuation surveys have been executed, the sub-division of each block into ten compartments having almost an equal number of first class trees will not be effected without some difficulty and additional inquiries being instituted.

This, however, constitutes nothing of an objection against the proposed system, as under any circumstances the number of first class trees in each compartment will only be approximately correct.

Felling limited to one compartment yearly deemed unadvisable.

9. Turning now to the actual working of the compartments, I may at once state that the opening of one compartment yearly to a clear felling of all first class trees is open to serious objections.

Many if not most of the richest teak tracts, as regards mature timber, are contiguous to the Yoma, where the streams being mere hill torrents of no great depth and width, it will be impossible to float out so much timber in one season as 5,000 to 8,000 logs.

From many portions of the higher hills it will take three or more seasons at least to float out so large a quantity of timber.

This is moreover not the only difficulty,—timber lying neaped in the hill water-courses, which are quite dry in the dry season, is exposed to injury and destruction by fire.

Most of the hill streams are likewise so contracted in size in the lower plains, consequent on the current in them being checked by the inundation near the main river, that great difficulty even now is experienced in the floating out of as much as 2,000 logs from the very largest of the streams in the course of one rains.

Opening three or four compartments simultaneously proposed.

10. As an amendment to the proposed plan, I would therefore suggest that three or four compartments be worked simultaneously, these compartments to be as near to each other as circumstances will admit, and the work limited to a maximum number of trees.

Reduction in standard girth unadvisable.

11. The proposal to reduce the standard minimum girth to 5 feet is open also to an objection. Many trees of that girth would yield timber less than 4 feet 6 inches in middle girth and come under the category of undersized timber.

There is comparatively so little revenue to be realized on such timber that it would be much more profitable to let such trees stand a few years longer and attain a girth of 6 feet.

Advisability, from a conservancy point of view, of adopting the system of clear felling by compartments.

12. With regard to the advisability of such a system of working from a conservancy point of view, it will be very evident to any one in the least acquainted with the teak forests of this province that its adoption is not advisable, unless other and direct measures are taken to meet the falling off in yield of timber, which is very likely to be the result of a clear system of felling.

The tendency of teak forests generally is to grow up in blocks of more or less uniform ages. This is explained by the fact that often over large areas seedlings, which have been suppressed for years, start up simultaneously when the bamboo happens to flower.

In some instances it is the result of toungya cultivation cutting back the entire forest over large areas.

Taking thus a start upwards at the same time, the trees eventually form belts of mature forest, in which but few seedlings are to be found consequent on the dense shade of the bamboo undergrowth.

Consequences of clear felling in places.

13. A felling simultaneously of all mature trees worth removal would in many parts result in a few unsound and irregular shaped trees of large size and a few seedlings only being left to contend with the encroachment of other species.

14. It will however be seen that the Officiating Inspector General considers that it is immaterial whether teak is reproduced over the whole area of the ordinary reserves, if reproduction is secured in the special reserves. The question of the advisability of adopting the system of "clear felling by blocks" is therefore dependent upon the practicability of raising more or less compact forests in the special reserves selected in the natural habitat of teak.

Reproduction immaterial in ordinary reserves.

15. Hitherto the difficulty connected with such an undertaking in the natural habitat of teak has been the want of a suitable description of labour—the want, in fact, of men amenable to control, acquainted with life in the forests, and proof more or less against fever.

Difficulties connected with artificial reproduction of forests.

16. When the condition of the more accessible and best situated forest tract suitable for special reserves is considered, it will be apparent that the artificial planting up of blanks will be the chief work to be taken in hand.

Planting up blanks the chief work in special reserves.

17. From the progress reports for 1872-73 and the previous year it will be seen that some progress has been made in the employment of the hill Karens, there being at the close of 1872-73 no less than 8 Karen tays or villages engaged more or less in the planting of teak in toungya clearings, representing an area of about 200 acres.

Successful employment of hill Karens.

18. The means which have been used for bringing about these results, as explained in the progress reports for 1869-70, paragraph 102, and for 1872-73, paragraph 33, are—

Measures adopted with Karens.

(1). The enforcement of Forest Rule IX in teak localities, whereby the Karens are restricted in their choice to forest void of teak in the matter of toungya land.

(2). Demarcation of forests as special reserves for improvement.

(3). The assurance that toungya grounds would be definitely abandoned to the Karens, and conservancy given up also in these toungya grounds, as soon as the progress of the work of improvements in the special reserves admitted of this being done.

19. The Karen toungya plantations of the past rains have now been examined and the results found to exceed my most sanguine expectations, the areas planted being stocked with teak seedlings (on an average) 700 to 800 on the acre, at 6 feet by 6 feet distances apart.

Perfect success of Karen toungya plantations.

Thus after years of effort and persuasion to no purpose, it has been found possible to call in and utilize the hill Karens in the resuscitation of the teak forests.

20. The importance of this result cannot be over-estimated when it is remembered that with the aid of these people not less than 1,000 acres can be planted up yearly with teak and other valuable trees in the Tharawaddie, Prome, and Rangoon Divisions.

Important results anticipated.

In other parts of the province where the Karen toungya grounds are contiguous to the teak localities, it will also be possible to effect much with the aid of these people.

21. It must, however, be clearly understood that the secret of success lies in the willingness of these people to undertake any work of the nature of forest improvement, in consideration of having toungya grounds abandoned to them according to *their* selection.

Willingness of Karens how explained.

To bargain thus with them is not only perfectly fair, on the ground of prescriptive rights to the forests being a thing utterly unknown, but also quite just, as remuneration is given for the labour performed at such a rate as to make the planting of teak very profitable.

It may be here mentioned *en passant* that the Karen toungya clearings being, as a rule, very large, the payments made in some instances to single cultivators amount to as much as Rs. 60 for the teak plants in one clearing.

22. Realizing as I do the great advantages accruing from the employment of the Karens, I cannot but urge this question of their future employment on the consideration of the Chief Commissioner.

Employment of Karens recommended.

23. The conditions under which their services can be obtained have been definitely ascertained, and all that remains to be done is to supplement the procedure connected with the demarcation of ordinary reserves by making the abandonment of toungya grounds definitely to the Karens conditional, on specific arrangements being entered into by them to cultivate their crops jointly with teak within the special reserves, or to assist in excluding fire from certain forest tracts near their villages.

Specific arrangements with Karens to be conditional in the definite abandonment of toungya grounds.

By the definite abandonment of toungya grounds is meant the making over of certain areas free from the operation of Forest Rule IX, whereby the Karens will be at liberty to consider the ground solely theirs for the purpose of cultivation.

Under such an arrangement each village will have certain areas definitely assigned to it as toungya grounds free from all restrictions as to preservation of teak and other valuable trees.

This scheme of employing the Karens and its advantages may be thus briefly noted:—

24. The method of employment is simply to mark and make over to the Karens the less valuable tracts within the special reserves for toungya cultivation, providing for the rearing of teak and other valuable plants along with their crops. The Karens have permission accorded to them to fell all teak trees flush with the ground, so as to insure single suckers

The Karen toungya cultivation system and its advantages.

being thrown out which, although growing very rapidly, will not suppress the seedlings around them, as is the case with larger teak trees left standing in a plantation.

At the close of the rains the areas thus planted are made over, thoroughly cleared, to the Forest Department, and payment made at the rate of Re. 1 per 100 seedlings, which is equal to about Rs. 10 per acre.

The areas thus taken over are protected from fire, and a *light* clearing only performed where it may be actually necessary towards freeing the crowns of the seedlings.

The cost of this system to the State can be definitely put down against one acre at—

	Rs.
For 1st year	10
„ 2nd „	8
„ 3rd „	5
„ 4th „	3
Total ...	26

to which if Re. 1 per acre be added on account of capitation-tax, to be paid for in behalf of the cultivators during the first year, and Re. 1 per acre yearly for supervision, the total cost of this system over one acre up to the close of the fourth year will be found to be about Rs. 31.

It is needless to observe that a more economical system of planting up the special reserves, so as to secure the early conversion of *irregular high forest* into regular high forest of successive ages, cannot well be devised.

Adoption of proposed working-plan quite safe.

25. With the prospect of thus carrying on works of improvement in special reserves, it is obvious that the proposed method of working the ordinary reserves is quite safe as regards future supplies of teak.

Protection from fire also possible with the aid of hill Karens.

26. It has also to be remembered that the treatment suggested for the ordinary includes operations for excluding fire from large areas in the higher hills.

Such an undertaking would be extremely difficult under any circumstances, except in the very remote portions of the forests.

It has been explained that the Karens are willing to undertake any works connected with the improvement of the forests contiguous to their villages, provided toungya lands, according to their choice, are definitely assigned to them free from all conservancy restrictions. Hence, if the proposed scheme for their employment is adopted in connection with the demarcation of ordinary reserves, no difficulty need be anticipated in the matter of protecting many valuable forest tracts from the annual fires.

A case in point is the Sinsway reserve in the Salween division, from which for the last four years fire has been excluded with the assistance of the Karens.

(*b*). *Special Reserves.*

Treatment proposed.

27. The measures proposed for the treatment of the special reserves are—

(1) A detailed topographical survey, based on a division into blocks and compartments, according to growth of vegetation, soil, growing material, &c.

(2) Framing of working-plans for conversion from irregular high forest to regular high forest of successive ages.

(3) The coppice system of clear cutting by areas in the case of cutch and fuel reserves, with reserved standard trees left to shed seed.

Detailed topographical survey necessary at the outset.

28. As explained by the Officiating Inspector General, a detailed topographical survey is absolutely necessary before a rational system of treatment can be devised in the form of a working-plan for each special reserve.

It is proposed that an estimate be submitted of the cost of executing such a survey of each special reserve.

Early survey of two or more special reserves recommended.

29. It would be preferable, however, to undertake such surveys on a limited scale for one year, operations being restricted to two or more reserves, and thus definite information will be obtained regarding total cost of work.

Work of improvement to be continued in meantime.

30. Pending the completion of such surveys, there would of course be no objection to the work of improvement, as far as the planting up of blanks and the poorer portions is concerned, being carried on with the aid of the Karens.

Existing plantations fall within special reserves.

31. As pointed out by the Officiating Inspector General, the existing plantations, with the exception of that at Kyek-poo-gan, will fall within the special reserves.

Although in many respects an excellent site for teak plantations, yet the Magayee tract, it must be remembered, was selected chiefly with reference to accessibility and facilities for procuring Shan labourers.

Extension of teak plantation Magayee not recommended.

32. There never has been a difference of opinion as to the hills constituting the best sites for teak plantations; and now that the question of procuring the necessary description of labour in such localities has been satisfactorily solved, the artificial cultivation of teak at the Magayee site should undoubtedly be abandoned.

33. Operations there should be limited to the rearing of other valuable species which are sure to thrive in the plains, such as *Ficus elastica* and "thitka," the bastard mahogany now coming into demand, as well as other trees which the proximity of Magayee to the Rangoon market may render it advisable to raise.

Rearing of other species proposed.

III.—Improvement of Forest Establishment.

34. The proposals of the Inspector General may be thus summarized :—

The following gradation scale of pay to be adopted for the subordinate forest establishment, which should be composed of three grades or classes—Foresters or goungwais, forest guards, and forest rangers, *viz.* :—

New grading recommended.

Forest guards, 3 grades, at Rs. 15, Rs. 18, and Rs. 20.

Foresters, 6 grades, from Rs. 25 to Rs. 50 per mensem, increasing by Rs. 5 at a time.

Forest rangers, 3 grades, from Rs. 100 to Rs. 200, with a difference of Rs. 50 between each.

35. The plan here suggested is all that can be desired for securing really efficient men for the work of the Department. It may be preferable, however, to have four instead of three grades of forest rangers, and fix the pay of the lowest grade at Rs. 75, whereby promotion in the case of a 1st grade forester will not involve an increase equal to doubling the pay.

Four grades of forest rangers preferable.

36. The separate organization of the office establishment of the Forest Department, with a view to secure regular promotion, is also recommended by the Inspector General.

Proper organization of office establishment proposed.

The time has certainly arrived for placing the office staff on a proper footing as regards prospects of promotion, and no better system could possibly be desired than that in force in the Department Public Works, by which promotion is secured by a fixed rule, the main feature of which is that pay increases by annual increments as a reward for good conduct.

37. As noted in the progress reports for 1871-72 and 1872-73, the want of definite information as to the extent of the forests about to be reserved has precluded the submission of proposals for a revised scale of establishment. So much progress will have been made in forest demarcation during the current year (1874) that it will be possible to submit proposals shortly which will provide the necessary increase of forest establishment in the three main forest divisions of the province.

Proposals purposely delayed hitherto.

Submission of proposals in current year possible.

At the same time it will be advisable to provide for the proper grading of the office establishments.

38. The Officiating Inspector General has also drawn attention to the condition, as regards pay, of the junior Assistant Conservators.

Extra allowance for Assistant Conservators.

The subject of an extra allowance was under the consideration of Government some years ago, when a similar concession was sought and obtained by the officers of the Department Public Works. The case of Assistant Conservators, 3rd grade, is certainly extremely hard, especially when they are employed at so expensive a place as Rangoon.

If the Assistant Conservators are, however, to be on an equal footing with their brethren serving in India, they should undoubtedly have an extra allowance granted to them.

39. The necessity for having supernumerary officers is also commented upon by the Officiating Inspector General.

Supernumerary officers required.

This year no less than four officers have been deputed to examine or visit forests either out of the province or at a distance from their divisions.

Application has been made for an officer to examine the hill tracts of Arrakan and the forests of the Bassein district.

With forest matters in such a progressive state as is the case at present, there is certainly ample means of employing two or more supernumerary officers for two or three years to come.

40. The formation of a "special works division" is also recommended by the Officiating Inspector General for the separate employment of officers in works unconnected with the improvement of the special reserves, which is to be left to the trained staff.

Special works division.

Such an arrangement will effectually guard against the withdrawal of valuable officers from the more important duties of the Department.

41. It will however be necessary to strengthen the staff of trained officers, who now number only four.

Considering the vast amount of work to be undertaken in the drawing up of working-plans for (1) special reserves and (2) cutch and fuel reserves, it is evident that at least two additional trained officers should be posted to this province.

Additional trained officers required.

42. While on the subject of forest establishments, it may not be out of place to refer here to the recently mooted question of employing the subordinate revenue officials in planting operations and other works of forest improvement.

Question of employing subordinate revenue officials in works of forest improvement.

Whatever may have been the prospective advantages of such a project while teak plantations were being formed as near as possible to the plains in order to secure labour, there cannot be the possibility of a doubt as to its unsuitableness where such work is limited to the hills, as will be the case in future.

A reference to the several opinions of district officers on the Chief Commissioner's minute on forest conservancy will shew that upwards of one-half of the civil officers are against such a proposition.

Question of making forest officers assistants to civil officers.

43. With regard to the question of making forest officers assistants to civil district officers, many civil officers have, it is true, expressed themselves in favor of it; but it is probable they may have been ignorant of the fact that the Forest Department is being filled with scientific and professionally trained men, and that its energies generally are to be directed to the improvement of forests—a subject on which, as remarked by the Deputy Commissioner, Shwe-gyeen, most civil officers will feel very diffident in expressing any opinion whatever.

IV.—Permit System.

Forms of permit proposed.

44. The proposals of the Inspector General relate chiefly to the form of permit to be used in the event of its being decided to retain the permit system in the working of the forests.

Two forms of permit are suggested—one in accordance with the present system of working, but without pre-payment of fee, and freed from all the legal defects of the form now in use, and subject also to these conditions:—

(1) Trees to stand three full years prior to removal.
(2) The outturn limited to a maximum number of logs.
(3) For the felling of green trees, girdling, &c., damages to be paid in accordance with a fixed scale.

The other proposed form of permit provides for the removal of all first class trees except those marked by Government.

As admitted by the Officiating Inspector General, the adoption of these two forms of permit will considerably increase the duties of the Forest Department, by reason of the additional supervision and inspection involved in them. The first of these forms also necessitates retention of girdling by Government.

Method of working proposed for permit system.

45. Another or third proposal is to have the permit system with the method of working by a clear felling of first class trees in compartments, as recommended for the ordinary reserves.

If the permit system is retained, it will certainly be preferable to limit it to forests in which this latter method of working can be introduced.

The disadvantages connected with the permit system are, however, so numerous, and loss of revenue so considerable, that it would certainly be better to discontinue it altogether, or retain it only in localities contiguous to the frontier, where the cost of working may be very great and risk of loss of elephants and timber is to be apprehended.

Forest rules.

46. In addition to the various subjects which have been discussed in order above, the report of the Officiating Inspector General treats also of the forest rules.

It will suffice to mention here that the proposed rules were circulated some time ago among the officers of the Department in Burma, and met with general approval.

Recapitulation of proposals on Officiating Inspector General of Forest's report.

47. In conclusion, it will be useful to recapitulate briefly the proposals which it has occurred to me to make with reference to the report of the Officiating Inspector General.

I.—Formation of Ordinary, Special, and District Forest Reserves.

(1) Conservancy rules not to be suspended in tracts excluded as toungya grounds within ordinary reserves until arrangements have been concluded for the employment of the Karens in works of forest improvement.
(2) The tracts to be set apart as district reserves to be selected without delay by civil officers.

II.—Treatment of the Forests.

(1) *Working-plan for ordinary reserves.*—Instead of one compartment yearly, there should be three or four compartments opened simultaneously for a felling of all first class marketable trees, but up to a maximum number yearly in each.
(2) That the standard girth of trees to be felled be not reduced to 5 feet.

Special Reserves.

(3) That special arrangements be entered into with the hill Karens, whereby they would plant teak, &c. (as is being now done), in the special reserves, in consideration of having toungya grounds abandoned to them in accordance with their choice, and free from all conservancy restrictions.

(4) That similar arrangements be entered into with the hill Karens for excluding fire from portions of the ordinary reserve contiguous to their villages, where the latter are distant from a special reserve.

(5) That a detailed topographical survey of a few of the special reserves be commenced next year preparatory to determining the cost.

(6) Pending completion of survey, that the planting up of all blanks be continued in special reserves.

(7) Planting operations at the Magayee site to be limited in future to other valuable trees—not teak.

III.—Improvement of Forest Establishment.

(1) That the grading proposed by the Officiating Inspector General be adopted with a slight modification.

(2) That an extra allowance be granted to Assistant Conservators, as suggested by the Officiating Inspector General.

(3) That supernumerary officers be retained for employment during the introduction of the measures now under consideration.

(4) That two additional trained officers be obtained.

IV.—Permit System.

(1) That the permit system be abandoned, or retained solely in frontier tracts which may be difficult to work.

(2) That the "clear-felling" method by compartments be adopted in the working of the forests under the permit system.

Memorandum on the selection of Ordinary and Special Forest Reserves, with proposals for the procedure to be adopted, by Captain W. J. Seaton, *Conservator of Forests, British Burma,— No.* 1856-21, *dated* 28*th February* 1874.

Review of present procedure.

It will be useful to commence with a brief review of the present system of setting apart reserved forests.

The procedure now in force is that which is laid down in Schedule I of the Forest Rules of 1865.

It involves in the first place the submission of a detailed report and map (on a scale of two miles to one inch) on the part of the divisional forest officer to the Deputy Commissioner.

After full information has been ascertained and noted regarding the villages affected directly or indirectly by the proposed reservation, the Deputy Commissioner forwards the report with his opinion to the Commissioner, who in turn attaches his opinion and transmits the papers to the Conservator of Forests, by whom they are finally submitted for the orders of the local Government.

On the promulgation of the Forest Rules of 1865, the local Government directed a joint inspection to be made by the civil officer and forest officer of the proposed reserve; but in 1867 this rule was rescinded, on the report of the Conservator to the effect that great delays arose out of the inability of the officers concerned to arrange for a joint inspection.

Drawbacks of present system.

2. The drawbacks connected with the present system may be thus noted:—

(1) A fully detailed report giving full particulars as to the resources of the forest unnecessary at the outset. The responsibility of selecting a suitable tract as regards resources rests entirely with the forest officer, while the question for the civil officer to decide is as to whether reservation will inflict hardship upon the people and check the spread of cultivation.

(2) The preparation of a map before the approval of the civil officer is obtained involves risk of loss of both time and money.

(3) Long delays consequent upon information regarding the villages affected being obtained (1) through the Myokes, then (2) through the Thoogyees and village headmen.

The required information regarding number of people, houses, and toungyas will be, it is believed, more readily obtained by a visit to the neighbourhood of the tract.

(4) The final submission of the proposals through the office of the Conservator of Forests quite unnecessary, unless it is to allow of explanation and exception being taken to the recommendation of the civil officer, when, of course, lengthy correspondence will be the only result.

Inability to effect joint inspection prior to 1867 explained.

3. As already mentioned, a joint inspection by the civil officer and forest officer was deemed to be impracticable prior to 1867; but the cause of this may be put down to the fact that at that time a forest division was generally administered by one forest officer, whose multitudinous duties required his presence almost constantly at or near the forests.

Another difficulty, which exists also to some extent at present, was the inability of the Deputy Commissioners to arrange anything definite beforehand with reference to their

movements, and to be absent from their head-quarters for a longer period than a week or ten days.

The first of these difficulties no longer exists; and as to the second, it may be assumed that if unable to make a joint visit to the district, the Deputy Commissioner can depute the Assistant Commissioner to go instead.

Joint inquiry imperative.

4. The desirability of having a joint visit cannot for a moment be doubted. It insures the question of reservation being early and definitely disposed of, and at the same time secures to the people of the neighbourhood an opportunity for stating in person their reasons against reservation and of obtaining full information.

The above remarks apply only to the procedure for setting apart reserved forests.

Selection of ordinary reserves.

5. What has now to be considered is a scheme for the selection as well as the setting apart of ordinary and special forest reserves.

First, with regard to ordinary forest reserves, it may be as well to note that they will be limited to the large blocks of hills paralled to the Yomas, and lying above (as a rule) the great belts of laterite and sandy soil which hold an intermediate place between the plains and the hills.

Within the ordinary forest reserves toungya lands will be allotted to the Karens, and full permission will be accorded to them and the surrounding population to collect minor forest produce, such as bamboos, grass, and less valuable trees, for their own use; but for the more valuable trees permits will have to be obtained, similar to those approved of by the Revenue Bill Committee for the disposal of valuable trees in the districts lying outside the forest reserves, and administered wholly by the civil district officers.

Bearing this in mind, and the fact that the ordinary reserves are intended merely to maintain the supply of marketable timber pending the formation of compact forests in the special reserves, and preserve the forest for climatic purposes on the higher ranges, it is evident that the selection of the ordinary reserves can be effected, as heretofore, by the divisional forest officer and Conservator in consultation with the civil district officer.

Selection of special reserves.

6. The case of the special reserves is obviously very different. They are required as sites for forming compact forests of teak and other valuable trees, and hence must be very carefully selected with due regard to the capabilities of the soil, growth of vegetation, and facilities for access and transport of timber. It therefore appears advisable that such reserves should be selected by a committee of experienced forest officers, of whom two should be of the staff of trained officers sent out by the Secretary of State, and who have acquired some local experience.

Scheme for selection and procedure or setting apart of reserves.

7. It now only remains to note—

I.—A scheme for the selection of ordinary and special forest reserves.

II.—The procedure to be adopted in the setting apart of forest reserves.

I.—Selection.

(1) *Ordinary Forest Reserves.*

Scheme for selecting ordinary reserves and special reserves for improvement.

8. The boundaries will be selected by the Conservator in consultation with the divisional forest officer and civil district officer.

(2) *Special Reserves.*

The divisional forest officer will examine the tracts possessing the conditions requisite for special reserves, and submit to the Conservator a sketch map and detailed report setting forth the general features and capabilities of the localities deemed by him to be suitable for the above purpose.

On receipt of this report, the Conservator will nominate two of the trained Assistant Conservators and the divisional forest officer to act as a committee, under his own direction as president, for the examination and selection of the tracts required for treatment as special forest reserves.

Should the divisional officer be a trained officer, one additional trained officer will suffice for the committee.

After a careful examination of the locality, the committee will draw up a report on the tract which is finally selected, and setting forth—

(1) The boundaries and approximate area.
(2) General configuration of the ground, drainage, exposure of the land, and capabilities of the soil.
(3) Character and growth of vegetables.
(4) Resources in valuable trees.
(5) Lines for the transport and floating of timber.
(6) Nearest market for disposal of ordinary produce and thinnings.
(7) Cost of extraction of timber, produce, &c.
(8) Facilities of access.
(9) Description of labor obtainable, and cost of same.
(10) Opinion and reasons for selection of particular tract, and suggestions as to future treatment.

II.—Procedure for Setting Apart Ordinary and Special Reserves.

(1) *Ordinary Forest Reserves.*

Procedure for setting apart ordinary reserves.

9. The forest officer in charge of the division, after consultation with the Conservator, will submit in person to the Deputy Commissioner of the district a memorandum (with sketch map) on the position and boundaries of the proposed reserves, and shewing the position and names of the Karen villages within the boundaries and of those contiguous to them.

The sketch map to be not less in size than 2 miles to the inch, and to be based either upon a standard map of the province or a rough topographical survey of certain main lines.

The Deputy Commissioner will, after consultation with the forest officer as to the most convenient period for visiting the district, cause notices to be issued to the headmen of all villages in the vicinity of the proposed reserves, and to the local revenue officials, particularizing the boundaries of the said reserves and method of reservation contemplated, and intimating that on or about a certain date or certain dates, of which precise information would be notified in due course, an open inqury will be held at certain places by the Deputy or Assistant Commissioner in the presence of the forest officer or Conservator, and with the object of ascertaining and taking into consideration claims for toungya grounds and whatever objections parties interested may wish to urge against reservation.

The notices to be issued at least one month before the date fixed for the inquiry.

At the inquiry full information will be given regarding the reservation proposed, and the descriptions of forest produce, such as bamboo, grass, and timber, which will remain free for the use of the people collecting it.

The result of inquiry will be embodied in a report drawn up jointly and signed by the civil district officers and forest officers present, and shewing—

(1) Position of villages within the boundaries.
(2) The number of houses or families in each of such villages.
(3) The toungya grounds to be excluded for their use, and the boundaries of same.
(4) Names of villages (with number of souls in them) contiguous to the boundaries of the proposed reserves.
(5) Objections in the case of each village against reservation, whether within or without the proposed boundaries.

The joint report will close with an expression of opinion on objections recorded, and with a specific recommendation as to the boundaries which it seems desirable to adopt.

This joint report will then be submitted by the Deputy Commissioner to the Commissioner, who will forward it with his opinion for the orders of the local Government, provided, however, that if further explanation is required, the Commissioner will refer to the Conservator.

(2) *Procedure regarding Special Reserves.*

Procedure for setting apart special reserves.

10. Should the site selected for a special reserve lie within the boundaries of an ordinary reserve, the Conservator of Forests will consult with the Deputy Commissioner, and draw up with that officer a suplementary report, stating whether any rights exist in the proposed reserve, and if so, what arrangements would be suitable for their partial or entire extinction, or what compensation should be paid, and to what villages it should be paid.

This supplementary report, together with the report of the Committee of Selection, will be submitted by the Conservator for the approval of the Commissioner, and finally forwarded, with proposals for reservation, for the orders of the Chief Commissioner.

If the site of the proposed special reserve is not included in an area sanctioned as an ordinary reserve, the procedure will be similar to that laid down for setting apart ordinary reserves, with the following exceptions:—

(1) Toungya grounds will not be included within it or provided for the Karens.
(2) Intimation will be given that strict reservation will be enforced, as explained in the Forest Rules.
(3) The rights of the people will be ascertained, and arrangement proposed for their extinction, in whole or part, by money compensation, or, as in the case of the Karens, by apportioning toungya land elsewhere.

What area should be demarcated as State Forest in Burma.—By D. BRANDIS, Esq., *Inspector General of Forests. Dated the 1st July* 1874.

IT would be vain to attempt at the present time in any part of India a final estimate of the area which should be demarcated as State forest. The requirements of the population and of export trade in the matter of timber and other forest produce will not remain the same; what they will be in future it is impossible to foresee, though it is probable that everywhere they will increase largely.

2. Moreover, we are met at the outset by a most difficult question, which has not yet been sufficiently elucidated by scientific research,—I mean the influence of forests upon climate and surface drainage. Whether the maintenance of existing forests or the creation of new ones in a tropical country is likely to have an appreciable effect upon the rainfall and the humidity of the atmosphere has not yet been ascertained. Interesting and enthusiastic discussions of this subject abound in late forest reports. I am therefore anxious to state that the climatic influence of forests in India has not yet been proved by conclusive evidence. It is probable that the outer hills of the Eastern Prome district have gradually become hotter and drier through the extensive toungya clearings of the last 20 years, which have destroyed the forest by which they formerly were clothed; but we have no proof yet that the annual fall of rain and dew have diminished in consequence. Since 1856, I have known the outer hills on the feeders of the Boolay and Nawing rivers as more dry and hotter than the outer hills of the Tharawaddi district. And Dr. McClelland, who visited them in 1855, describes them as dry and parched ("Selections from Records of Foreign Department," IX, page 108). In those days these hills were covered with forest of the deciduous bamboo, myinwa (*Dendrocalamus strictus*), while the inner hills were green with forests of evergreen bamboo, particularly kyathounawa (*Bambusa polymorpha*).

There is no doubt, however, that the denudation of the hills of Burma would have a most injurious effect. Forests regulate the surface drainage, protect the soil on hillsides, and prevent the silting up of valleys. Even in the plains and on undulating ground denudation may be mischievous. Large clearances have, I understand, been made in the belt of eng forest, and this may, as shown by Mr. Theobald, result in converting a large portion of this tract into a desert.

3. So much, however, is certain, that in forming our plans for the selection and demarcation of State forests in the tropical provinces of India, we must calculate upon a large increase of the requirements in the matter of timber and other forest produce, and that besides this we must, in mountainous districts, guard against denudation. In Burma, as in most other parts of India, the chief difficulty will be to obtain, free of toungya cultivation and other interference, an area of sufficiently large extent for our requirements and for the general objects indicated. We may put aside for the present the hills of Arracan and some parts of Tenasserim, where population is as yet too sparse, and the forest not yet sufficiently valuable to call for a settlement of the question at the present time. But in Pegu and in the northern part of Tenasserim it will not be easy to obtain a sufficiently large extent of forest valuable enough to justify its reservation.

4. I propose to discuss, *first*, the present requirements in the matter of teak timber and other forest produce; and *secondly*, the proportion of State forest to total area in several provinces of India and in European countries.

The outturn of the Government forest in Burma has been as follows, from the time that the first attempt was made to place them under regular management:—

	Logs.	Tons.	Per annum. Tons.
From 1856-57 to 1861-62	167,780	121,146	20,191
„ 1862-63 to 1867-68	268,426	190,726	31,787
„ 1868-69 to 1872-73	291,319	231,458	46,291
In 17 years	727,525	543,330	31,960

This is the yield of about 2,400 square miles, and it has gradually increased from 20,191 during the first six years to 46,291 tons during the last five years. During the same period the forests beyond the frontier have yielded between 50,000 and 100,000 tons annually, the average during the last six years having been 77,300 tons. The total annual export from the different ports has fluctuated between 69,000 and 145,000 tons.

These data make it clear that the present local and export requirements are not less than 123,000 tons annually. That they will not diminish is certain; to what extent they will increase it is impossible to say. Nor is it known how far the exhaustion of the forests beyond the frontier has progressed; hitherto the rise in the price of teak timber seems to have been sufficient to counterbalance the increased difficulties of working, but sooner or later the supplies from that source must diminish.

5. It seems, therefore, reasonable that we should require the forests of the future in British Burma to be sufficiently large to yield at least a quantity equal to the outturn of the British and foreign forests combined during the last five years. Mr. Powell, in the 176th paragraph of his report, seems to have had this idea, and his conclusion is that 250 square miles of special reserves will furnish an annual yield of at least 128,000 tons. This conclusion is based upon an estimate (40 cubic feet per annum per acre) which I made of the yield of a well-stocked teak plantation in my report on the working-plan of 1868. That estimate was not, however, intended to apply to natural forests. However carefully protected and improved by cultivation, they will never be pure teak forests, but teak will be mixed and must be mixed in them largely with bamboos and other trees. No forester is at present in a position to form an estimate of what their yield in teak timber will be; but for generations to come their annual yield will certainly not be anything like 40 cubic feet per acre.

6. It has been shown above that during the last five years 2,400 square miles of teak-producing tracts have yielded 46,291 tons annually. This is at the rate of 19 tons per square mile, or $1\frac{1}{2}$ cubic foot per acre.

The special reserves will be carefully selected; they will comprise the most productive forest tracts; their yield will therefore at the outset be considerably more than that of the great mass of the Government forests; and by keeping out fires and planting teak in toungyas, they will certainly improve. But it is not intended to clear the forest and plant, nor would that be practicable in the feverish localities where the best of them will be situated. If we and our successors manage to increase their yield five-fold, there will be abundant reason to be satisfied with their management. One hundred tons per square mile, or 7·8 cubic feet per acre, is as much as, according to the present state of our knowledge, we are justified in expecting from the special reserves, and this estimate will require the demarcation, not of 250, but of at least 1,200 square miles.

7. When framing the preliminary working-plan for the five years from 1868 onwards, I did not venture to form an estimate of the area of the reserves, the demarcation of which, together with the formation of plantations, formed the principal feature of that working-plan. The reason was that in those days it was considered by many possible to extend plantations at a moderate cost, and preferable to form large areas of new forest by planting in localities easily accessible and nearer to a market than the natural forests. Considering the difficulties of procuring labour, the results of Captain Seaton's operations in this respect, as recorded in the report for 1872-73, have been most satisfactory. Excluding all experimental plantations of small extent, the area planted to the end of that year has been—

	Area.	Total cost.	Per acre.
		Rs.	Rs.
Rangoon division	825	67,094	81
Tharawaddi „	484	48,946	101
Sittang „	714	22,280	31
Total ...	2,020	1,38,320	68

Of this area 1,780 acres were planted during the last five years, or at the rate of 356 acres annually. The experience up to 1868 seemed to show that it would be possible to keep the expenditure below Rs. 30 per acre, and this expectation has nearly been realized in the Sittang division, though not in the two others. In his review of forest administration in Burma, Captain Seaton states

that on the estimate of the yield of plantations framed in 1868, and under the assumption of a surplus revenue of Rs. 35 per ton, with compound interest at the rate of 5 per cent., Rs. 53 per acre is the limit of the outlay. Such calculations are useful; but as the data upon which they are based are as yet uncertain, they must not be taken as an absolute guide. No certain data are as yet available to calculate the maximum outlay that may profitably be incurred in forming teak plantations in the different districts of Burma. It is quite possible that in the vicinity of Rangoon thinnings and small timber will sell so well as to justify the present high outlay in that division. Neither the Sittang (Pyoonchoung) nor the Rangoon (Kyekpyoogan and Magayee) plantations are in good teak localities, where the tree is likely to form tall and regularly-shaped stems. This was fully considered in 1868, but it was thought that in these cases the vicinity of the market and the greater facility of supervision were sufficient to counterbalance this disadvantage; and future experience will doubtless prove that it was right to commence operations in localities easy of access.

8. The Tharawaddi (Choungwa and Kwaymakeing plantations) are in the heart of excellent teak localities, but there the expenditure has been more than three times that near Toungoo, and the prospect of an early return by the sale of thinnings is remote and uncertain. In such places, however, as indeed in all reserves to be demarcated, Captain Seaton is confident of raising teak extensively through the agency of toungya cultivators, and the reports on this subject show that as long as the control of the Department is in his hands or in the hands of an officer equally skilful in the management of these tribes, teak cultivation by the agency of Karens, Yabines, and other inhabitants of the hills will continue to be an important measure for the production of teak in Burma at a comparatively small outlay. In his review, page 32, he gives the area thus covered with teak (at the rate of 400 seedlings per acre) at 363 acres. But the system is yet experimental, and it would not be right to build the estimate of the forest area required upon the probability of its success.

9. Under these circumstances, the policy of Government seems plainly this: steadily to continue planting by the agency of toungya cultivators or otherwise, where it can be done at moderate expense; but in estimating the area to be demarcated as State forest, not to anticipate that these reserves will furnish a yield equal to that of compact plantations.

The area mentioned above, 1,200 square miles, as the aim towards which we should work in the selection of the permanent forest reserves for the production of teak, is based upon as safe data as we at present possess. We have no forests now in Burma which yield an annual outturn of 100 tons per square mile; but it seems possible eventually to attain this point by the exclusion of fires and by planting. A large portion of these reserves will be on the hills between Sittang and Irrawaddi; smaller tracts will be demarcated west of the Irrawaddi, east of the Sittang, and in the Tenasserim division. According to Captain Seaton's review, page 29, 74½ square miles of this area have already been finally demarcated as special, and 61 as ordinary reserve,—total 135½ square miles; this has been the work of ten years. But in addition to this, a considerable area has been demarcated and surveyed, though not yet finally sanctioned.

It seems to me that special arrangements should now be made to effect the demarcation of the whole area mentioned, or of as much of it as can be secured within the next three years, and that during this time the current work in other branches should be reduced to a minimum. Girdling operations should certainly be suspended during this period.

10. So much as regards the area required to supply teak. These reserves will have an additional value by supplying other woods and bamboos; but the excellent properties of teak timber will continue to secure to it the first place.

Besides these, it will be desirable to demarcate for permanent reservation tracts of the moister forests, producing wood-oil, thingan, thikkadoe, and other valuable trees. The plan of protecting them in the proposed ordinary reserves by imposing restrictions regarding their use and cutting will, I fear, lead to no useful result. It will occupy a large share of the time of forest officers; it will compel them to look after trees scattered over extensive areas; it will produce endless complaints, and in the end effect nothing but the protection of a few

old trees. The demarcation as reserves of suitable tracts for the production of these trees is the only plan that will lead to satisfactory results.

11. In the case of cutch, this has already been acknowledged; the demarcation of 84 square miles of cutch reserves in the Prome Division has been proposed, and other cutch tracts in that and in the Tharawaddi Division have been examined for that purpose. What area of catechu forest will ultimately have to be demarcated it is impossible now to say. In paragraph 55 of his report, Mr. Powell gives the export of cutch at 415,610 maunds in 1872-73, two-thirds of which came from British territory. Catechu is a valuable substance, not likely to be superseded by new discoveries. It will be well to collect data regarding the quantity of wood required to produce one maund of cutch, and the probable yield per acre. When this has been ascertained, a conclusion as to the area of cutch reserves may be formed. I am inclined to think that 200 square miles will be within the mark; and I much doubt whether it will be possible to obtain them.

Tracts for the production of fuel in the vicinity of the projected Rangoon and Prome Railway have also been selected to the extent of 70 square miles.

12. Including the proposed cutch and fuel reserves, Captain Seaton reports (paragraph 20 of his report for 1872-73) that 567⅓ square miles have been surveyed, mapped, and proposed for demarcation.

The following figures show what in the present state of our knowledge we ought to propose as the aim towards which we should work. Arracan, Tavoy, and Mergui are omitted.

	Square miles.
Teak-producing forests	1,200
Moist forest, cutch reserves, and fuel-producing tracts	400
Forest land on the higher hill ranges, not coming under the above classes, say	400
Total ...	2,000

Area and population of the districts in which these forests are to be reserved are as follows:—

		Population.	Cultivation.	Total area.
1.	Prome	274,872	282	2,887
2.	Henzada	460,020	416	4,150
3.	Thayetmyo	140,470	154	2,397
4.	Rangoon	387,812	827	9,608
5.	Bassein	321,121	366	8,066
6.	Shwoay-gyeen	127,378	123	5,567
7.	Toungoo	81,014	56	6,354
8.	Amherst	236,667	362	15,203
9.	Salween	25,953	18	4,646
	Total ...	2,055,302	2,604	58,878

13. The reserves, therefore, as here proposed, will occupy 3⅓ per cent. of the entire area. The figures of the preceding statement are taken from the Administration Report for 1872-73. It would be useless to speculate about the relation between the area proposed to be reserved and the population and cultivated area, for by the time that the demarcation of the reserves will have been completed cultivation will, if all goes well, have extended largely, and the population will likewise have increased. Mr. Powell justly draws attention to the fact that in 1861-62 the total population of Burma was 1,897,897, and in 1871-72, 2,562,323. In 1872-73 it increased to 2,747,148.

The question is—Does 3⅓ per cent. on the total area appear too large an extent to be permanently demarcated as State forest in the districts mentioned?

14. The three Indian provinces in which the demarcation of State forests has nearly been accomplished are the following:—

	Area.	Area of reserves.
Sindh	48,800	500 sq. miles.
Oudh	24,000	824 ,,
Central Provinces	84,162	1,869 ,,

Thus, in Sindh, the State forests occupy about 1, in Oudh 3, and in the Central Provinces 2 per cent. of the entire area. In the Central Provinces large additions are contemplated (sâl forests of the Maikal range and others), and both in Sindh and Oudh it is acknowledged that the reserves are insufficient. But the export of timber from these three provinces is insignificant,

and Burma will always be one of the most important, if not the most important, source for the supply of teak timber. More than one-half of the area here indicated will be required to produce teak, other wood, and cutch for export.

15. It may not be out of place to compare the percentage of State forests in some countries of Europe. I omit Sweden and Norway, with 60 and 66, and Russia with 31 per cent. forest of the total area. The following are the data regarding Austria and some of the principal German States, taken from Dr. Leo's "Forest Statistics" :—

	Percentage on total area		
	Of State forest.	Of forests of other proprietors.	Of total forest area.
Austria	6·3 per cent.	23·2 per cent.	29·5 per cent.
Bavaria	12·4 „	22·0 „	34·4 „
Wurtemberg	10·0 „	20·5 „	30·5 „
Baden	6·0 „	27·4 „	33·4 „
Saxony	10·7 „	20·9 „	31·6 „
Prussia	6·9 „	16·5 „	23·4 „

France has about 9 millions of hectares under forest, amounting to 15 per cent. of the entire surface. Of this area, about 6 millions belong to private persons, 2 millions to towns, village communities, and public institutions, and nearly 1 million of hectares, or not fully 2 per cent., are State forest. But in France the communal forests are managed by the officers of the State Forest Department, and yet the importation of timber is considerable, and increases steadily.

16. In comparing the forest area of Europe with that proposed to be reserved in the different provinces of India, we must bear in mind that the consumption of firewood is less in India, but that on the other hand the rains are heavier, and their effect upon barren hillsides more injurious. In other respects also it is probable that the beneficial influence of forests is greater within the tropics than in a temperate climate. It is difficult to draw any practical conclusion from these figures, except so far that 3 to 4 per cent. of the entire area is *primâ facie* not too large a proportion to be reserved as State forest in this country.

This of course is only a general expression without much value, for the proportion will necessarily vary in the different districts of Burma.

So much however is clear, that in aiming at the demarcation of 2,000 square miles as a permanent reserve, we do not indulge in extravagant projects; and I may add that in my opinion it will be exceedingly difficult to secure even this limited area in conveniently situated blocks of good forest land.

No. 802, dated the 28th July 1874.

From—A. O. HUME, Esq., C.B., *Secretary to the Government of India,*
To—*The Chief Commissioner of British Burma.*

I AM directed to acknowledge the receipt of your Secretary's letter No. 1593-27, dated the 21st ultimo, with enclosures, together with the copy of a minute recorded by you on the 8th idem on the reorganization of the forest system of British Burma based upon Mr. Powell's report.

2. Numerous questions discussed in Mr. Powell's interesting report need not here be examined; it will suffice to notice the following points, which form the subject of your minute, and regarding which orders are required at the present time:—

I.—Reserves.
II.—Plantations.
III.—Forest rules.
IV.—Working-plan of the forests.
V.—Permit system.
VI.—Establishments.

3. The necessity of providing for the future supply of timber and forest produce by the demarcation and gradual improvement of a sufficient area of forest reserves, in addition to new forests, which may be formed by planting, is now agreed upon on all sides, and does not require further discussion.

Mr. Powell proposes the formation of three classes of reserves, *viz.*, *special reserves*, for the production of teak, catechu, and other valuable trees; *ordinary reserves*, to be protected mainly in order to guard against the evil effects of denudation, and to furnish timber during the interval which must elapse until the special reserves are converted into compact and productive teak forests; and, lastly, *district forest reserves*, to provide towns and the agricultural population in the plains with the needful forest produce.

4. It seems to be intended to constitute the forests of the last-named class as communal forests, under the control of civil officers, and to devote the surplus proceeds of their management for the benefit of the communities to which they may be assigned. His Excellency the Governor General in Council considers this an excellent suggestion, and awaits with interest further reports regarding the action taken by you in this matter. These district reserves should be demarcated, otherwise it will be impossible to protect them against encroachments.

5. A large portion of the country it is proposed to set apart under the designation of ordinary reserves. Inside these it is intended to mark off toungya grounds for Karen and other villages, to prohibit the cutting of certain kinds of timber, and to place under control the collection of thitsi, wood-oil, leaves, and other forest produce. These ordinary reserves it is not apparently intended to maintain permanently for the production of teak and other valuable woods. The future supply of timber is to be provided for by the improvement of the special reserves.

6. The area of the special reserves required for this purpose is estimated by Mr. Powell at 250 or 300 square miles. This area, it is thought, will produce, at the rate of 40 cubic feet per acre, an annual yield of 128,000 tons of teak timber, which would equal the present annual yield of the forests in British and foreign territory, the timber of which is brought to Rangoon and Moulmein. This estimate is endorsed by yourself; but it appears doubtful whether the yield of the natural forests, howsoever much we may hope to improve them, will attain 40 cubic feet per acre. On this subject I am directed to communicate for your consideration a memorandum by the Inspector General of Forests, from which it will be seen that Mr. Brandis is of opinion that we are not justified to expect an annual yield of 120,000 tons from a less area than 1,200 square miles of improved reserves.

7. In addition to the teak-producing reserves, Mr. Powell and the Conservator proposes, and you approve of, the demarcation of reserves for the production of catechu, and for the maintenance of a sufficient supply of other

valuable kinds of timber which are not found in the teak localities; and the steps taken by you for the formation of fuel reserves for the use of the projected Rangoon and Prome Railway and of towns and the larger villages in the vicinity of the line have been separately reported. For these purposes, and in order to guard against denudation of the hills, forest tracts in various parts of the country must be reserved in addition to the teak reserves already mentioned; and having due regard to these various requirements, it does not seem unreasonable to suppose that, as suggested by Mr. Brandis, upwards of 2,000 square miles of reserves must eventually be demarcated to form the forest domains of the State in Pegu and Tenasserim. As explained in Mr. Brandis's memorandum, this will not provide for the requirements of Arracan, or of the districts of Tavoy and Mergui. From the Conservator's report for 1872-73, it is gathered that in addition to 134 square miles already demarcated, 567 square miles have been surveyed and mapped, and that proposals regarding their reservation have already been submitted. Some of these areas, it would appear from Mr. Powell's report, are not considered suitable for permanent reservation, and such as on mature consideration are not found promising should be excluded; but so much seems clear, that progress has been made in this respect.

8. The plan proposed by Mr. Powell of establishing two classes of reserves, *viz.*, a small area of special and a much more extensive area of ordinary reserves, appears to the Governor General in Council to be open to serious objections. The extent of the contemplated ordinary reserves will be so large that efficient protection will be difficult. A list of 19 kinds of reserved trees is proposed, which are not to be cut, lopped, burnt, or otherwise injured. So large a number of species, I am directed to observe, it will be quite impossible to protect. It will be sufficient to draw your attention to the difficulty of identification, and the consequent uncertainty which must attach to all proceedings arising out of the attempt to reserve so great a variety of trees. Experience in other parts of India has shown that such provisions, if they relate to more than a few kinds, cannot be enforced, and that the prohibition regarding them remains a dead letter.

9. Within the ordinary reserves it is proposed to mark off toungya grounds for the Karens and other inhabitants of the hills; but as population increases, constant demands for an extension of these grounds will be made, which it will be difficult to resist. It is proposed to permit toungya cultivation to those people only who consent to sow teak. This the owners will doubtless readily consent to; but the control of these operations over such extensive areas will be extremely difficult and harassing both to forest officers and to the people concerned. It is also further proposed in these ordinary reserves to control the collection of wood-oil, thitsi, leaves, and other forest produce, and this also seems to be a large undertaking, which will produce much petty annoyance to the people without effecting any real good. Upon the whole, the advantages of creating these ordinary reserves in the manner proposed seems extremely doubtful. It is difficult to understand how the first condition of forest management, the protection of the boundary lines against encroachment, can be secured over these extensive tracts, where, in addition to the outer boundaries, the demarcation lines of toungya grounds inside the reserves must be watched.

10. Nevertheless, His Excellency the Governor General in Council does not desire to pass final orders on this question at present. One point is certain, that it is necessary to simplify the forest system of Burma as much as possible, and for this reason it is recommended for your earnest consideration whether it will not be sufficient to form one class of permanent reserves in addition to the district forests. Should you on further consideration agree with this view of the case, then every exertion should be made to complete the demarcation of the permanent forest reserves within a limited number of years, for with the present most satisfactory increase of population in Burma, the task of selecting and demarcating these reserves will become more difficult every year.

11. By this time the forests ought to be sufficiently well known to enable the forest officers to proceed with more despatch in the selection of the forest

tracts to be permanently demarcated. From the reports before the Government of India, it is gathered that the main difficulty has hitherto been the delay which intervened between the proposal of the Conservator and the final sanction of the reserves. The suggestions made by Captain Seaton for simplifying the mode of procedure, embodied in a memorandum of 28th February last, which is among the papers submitted by you, seem to be calculated to obviate this difficulty, and the Governor General in Council trusts that you will find it possible to make such arrangements as will ensure steady progress in this respect in future. The Conservator should concentrate upon this work the entire available strength of his establishment; and I am directed to suggest for your consideration whether for this purpose girdling operations should not be suspended during the next two years. A similar suggestion was made as long ago as October 1870 in the orders on the progress report for 1868-69,* and I am directed to invite your attention to those orders.

* No. 620F., dated 15th October 1870.

12. The necessity of a topographical survey of the demarcated reserves, which is adverted to in paragraphs 177 to 185 of Mr. Powell's report, is fully recognized by His Excellency in Council, and it is intended, as soon as demarcation has progressed sufficiently, and as soon as the work now in hand in North-Western India is completed, to transfer the Forest Survey Department to Burma, to undertake the preparation of the needful maps of the reserves.

13. Regarding plantations, it is satisfactory that without counting experimental plots 2,024 acres were stocked with teak by the end of 1872-73, and that the area proposed in the working-plan of 1868 to be planted annually (350 acres) has been maintained. The cost, however, has been Rs. 68 per acre on the average, or double of what was estimated in 1868, and it is noticed that the most expensive (Rs. 101 per acre) were those in the Tharawaddi district, in the heart of the best teak localities, and the cheapest those near Toungoo, which only cost Rs. 31 per acre. As regards the localities where these operations should be continued, it is observed that Mr. Powell's suggestions are the opposite of those which were urged by your predecessor in 1870. In reply to the proposals then made by General Fytche,† to concentrate these operations in the vicinity of the port of Rangoon, the Government of India explained‡ the principles which should guide forest officers in selecting land for these plantations. It was said that soil and other circumstances must be favorable for the growth of teak, that there must be facilities for the export of timber, that the localities must be easy of access, and labour easily attainable. These considerations should still be kept in view. It is satisfactory to find that the success which has attended Captain Seaton's efforts to induce toungya cultivators to grow teak on a larger scale have been attended with such signal success that you expect that hereafter it will be possible to plant 1,000 acres annually in the heart of the teak forests at a cost of Rs. 31 per acre. The difficulty, it is believed, will be that the Karens, who will mostly be employed in these operations, are notoriously erratic and irregular in their habits, and that it may be found difficult to induce them to plant continuous areas.

† Paragraph 19 of Colonel Fraser's letter No. 97—23F., dated 2nd May 1870.

‡ Paragraph 5 of Public Works Department letter No. 632F., dated 20th October 1870.

14. It is however evident from Captain Seaton's report that he is aware of this difficulty. If the raising of teak in toungyas progresses as it has commenced, the improvement of reserves will be a comparatively easy matter, and this will place the entire forest system of British Burma upon a new and safe footing. On the other hand, it is evident that success in this respect to a great extent must depend on the personal qualifications of the officer in charge. Captain Seaton evidently enjoys the confidence of the Karens, and is careful in selecting his subordinates for dealings with these timid people, and the Governor General in Council concurs with you in highly commending his success in this matter.

15. The annual grant for teak plantations will, as hitherto, be fixed at Rs. 30,000, and if, as you say, this will suffice to cover nearly 1,000 acres in the hills, the result will be most satisfactory; but it is in no way desired to fetter you in the selection of suitable blocks for these operations. It may, under certain circumstances, be a most useful undertaking to raise compact

forests of limited extent in the vicinity of the large rivers or near towns for the production of small building timber. Such localities will always have the advantage that thinnings can be sold and will be a source of profit instead a cause of expense.

16. Before any action is taken with regard to the new draft of forest rules proposed by Mr. Powell, a report from you will be awaited on the question whether on further consideration you desire to maintain the distinction between ordinary and special reserves.

I am further directed to ask whether you desire to include in the rules detailed provisions regarding the procedure for selecting and demarcating reserves. In the old rules these provisions were entered in Schedule I, which the Chief Commissioner had the power to alter from time to time as circumstances might require, and this seems the more convenient arrangement.

17. It seems doubtful whether it is expedient to insert in the rules provisions of a purely administrative nature, such as among others are contained in sections 12, 18, 19, 20, 38. It may be embarassing sometimes to give the force of law to such detailed provisions. Rule 38, which provides for the issue of free permits by headmen of villages in the vicinity of the reserves for the collection of minor forest produce, seems doubtful, and should certainly not be legalized.

Upon the whole, the Governor General in Council is disposed to think that the rules as drafted by Mr. Powell will require careful consideration before steps can be taken to legalize them. Regarding one point, however, action seems to be required at once. The forests west of the Irrawaddi river were not included in the rules of 1865, and from what is said regarding them in Captain Seaton's report for 1872-73, and in Mr. Powell's report, it seems desirable that they should now be included. I am therefore directed to request that you will submit a statement of the proposed limits of those forests, analogous to the limitation of the forests contained in rule 2 of the forest rules of August 1865.

18. The next subject regarding which orders are required relates to the working-plan of the forests regarding the formation of reserves and planting operations. The needful orders have already been communicated in the first part of this letter; it now remains to say how felling and girdling operations are to be regulated. Mr. Powell proposes that, after excluding all the special reserves, the whole of the ordinary reserves and other teak localities of each of the 5 main divisions should be divided into 10 blocks, and that each block should be sub-divided into 10 compartments, each compartment containing, as near as can be ascertained, an equal number of first class trees. It is noticed that in his memorandum of 28th February, the Conservator draws attention to the difficulty of this task, the advantages of which, in the opinion of the Governor General in Council, seem doubtful. Captain Seaton proposes an amended plan, which is accepted by you; but I am directed to state that if, as already suggested, girdling operations are suspended during the next two years, there will be time for a full consideration of the plan on which the forests not included within reserves should hereafter be worked.

19. Regarding the permit system, the Governor General in Council has no hesitation in entirely accepting your conclusions. It should be abandoned as soon as possible, save in a few outlying forest tracts; except in such localities, all existing permits should be allowed to lapse, and should not be renewed, and fresh permits should not be issued. It appears certain that the permit system has in many respects been useful; but it has now done its duty, and its abandonment is an important step in advance towards the better conservancy of the Burma forests. The timber will now, as you propose, be brought out by Government contractors from all forests. Whether this change of system will, as you seem to expect, result in considerably increasing the net revenue from the forests seems doubtful; but its advantages for a more efficient conservancy are undeniable.

20. Mr. Powell justly draws attention in his report to the necessity of bringing into use, more than hitherto, other kinds of timber besides teak. It is gathered from previous forest reports, particularly from the reports for 1860-61 and 1861-62, that considerable quantities of such woods were formerly

brought for sale on Government account to the timber depôt at Rangoon, and from the Conservator's report for 1872-73 it would appear that on a smaller scale the experiments of 1860-61 have from time to time been repeated. These experiments, if made as occasion arises, with a few well-selected kinds, will doubtless be useful. It is for consideration whether a complete and well-arranged collection of Burmese timber and forest produce at the Conservator's office would not serve to bring woods and other produce more prominently into notice.

21. The last subject regarding which orders are required relates to the reorganization of establishments. It seems clear that owing to the general rise of wages the rates of pay formerly fixed for the subordinate forest officers are no longer sufficient, and the Governor General in Council awaits your definite proposals regarding the revision of the establishments. The following classification of forest establishments under the rank of Assistant Conservator it is intended to adopt in the provinces under the Government of India, and I am directed to communicate an abstract of it, with the request that in the proposals to be submitted it may, as far as practicable, be adhered to:—

I.—Executive Forest Officers.

A.—Sub-Assistant Conservators, on Rs. 200.

B.—Forest rangers—

1st grade, on Rs.	150	4th grade, on Rs.	80
2nd „ „	120	5th „ „	60
3rd „ „	100	6th „ „	50

II.—Protective Forest Officers.

C.—Foresters—

1st grade, on Rs.	40	4th grade, on Rs.	25
2nd „ „	35	5th „ „	20
3rd „ „	30	6th „ „	15

D.—Forest guards—

1st grade, on Rs.	12	3rd grade, on Rs.	8
2nd „ „	10	4th „ „	6

The lowest grades of forest guards will probably not be applicable in Burma.

22. The Governor General in Council cordially endorses what you say in paragraph 11 of your minute regarding the employment of Burmans in the higher posts of the Department, and I am directed to state that in revising the establishment special care should be taken to provide a sufficient number of appointments, from which promising native officers may be promoted to the superior branch of the Department. Mr. Powell's remarks regarding the necessity of assigning a specific range of duties and a definite responsibility to each forest officer should be recommended to the special attention of the Conservator, for in this manner he will best succeed to ascertain the fitness of his native officers for the superior grades, and to prepare them for responsible situations. The office establishments of the Forest Department should, as Mr. Powell correctly remarks, be arranged in a properly graded and classified scale, so as to afford to the younger men reasonable prospects of advancement to the better paid posts in the larger offices of the Department.

23. As regards increasing the number of Deputy and Assistant Conservators sanctioned for Burma, your definite proposals are awaited; they should, however, be supported by a detailed statement of the proposed organization of the forest area and the number of local divisions which it is intended to form. The Governor General in Council acknowledges that, in order to enable the Conservator to proceed more rapidly with the work of demarcating the forest reserves, and of organising the working of those forests on Government account which have hitherto been held by permit-holders, he will require a more efficient staff than he seems to have at present. It will be considered whether it will be practicable to transfer one or two promising junior officers from other provinces; and in compliance with the suggestion made in paragraph 15 of your minute, two of the trained assistants expected from home by the end of this year will be assigned to Burma.

Your decision not to recommend any special Burma allowances for Assistant Conservators is correct. No proposal to that effect can be entertained. The position of forest officers in Burma may, however, be improved in other ways; and I am directed particularly to invite your attention to the remarks made in paragraph 279 of Mr. Powell's report on the necessity of providing a larger number of rest-houses for them in the forests. His Excellency in Council will be glad to learn what action you propose taking in this respect.

24. In paragraph 14 of your minute, you suggest that an Assistant Conservator of experience should be attached as Assistant Secretary to the Chief Commissioner's Office. This, I am directed to observe, would be a difficult arrangement, which might be productive of inconvenience. If a junior forest officer were appointed as Assistant Secretary, it would be necessary to place him in a definite relation to the Conservator, for the Conservator should not be superseded in his relations to the Chief Commissioner, which should be analogous to those of the Chief Engineer of the province. A better plan would be to appoint the Conservator *ex officio* Under Secretary in the General Secretariat, and to release him of part of his duties of inspection by gradually increasing the number of efficient senior officers under him.

25. Mr. Powell's report will be circulated with a copy of your minute, these orders, and of Mr. Brandis's memorandum. The Governor General in Council gladly takes this opportunity of again expressing his sense of the excellent services rendered by Mr. Powell during his deputation to Burma.

Nos. 26 / 917—928.

Extract from the Proceedings of the Government of India in the Department of Revenue, Agriculture and Commerce,—dated Calcutta, the 12th August 1874.

[FORESTS.]

READ—

A report on the forest system of British Burma, by Mr. B. H. Baden-Powell, Bengal Civil Service, Officiating Inspector General of Forests.

A minute, dated the 8th May 1874, by the Honorable Ashley Eden, Chief Commissioner of British Burma, with the papers accompanying.

A memorandum, dated the 1st July 1874, by Mr. D. Brandis, Inspector General of Forests, on the demarcation of State forests in British Burma.

Letter from the Government of India, Department of Revenue, Agriculture and Commerce, to the Chief Commissioner of British Burma, No. 802, dated 20th July 1874.

ORDER.—Ordered, that copies of the above report and papers be forwarded to the Governments of Madras and Bombay for information, and to the local Governments and Administrations marginally noted for information and circulation to officers of the Forest Department.

Bengal.	British Burma.
North-Western Provinces.	Mysore and Coorg.
Punjab.	Ajmere.
Oudh.	Assam.
Central Provinces.	Hyderabad.

(True extract.)

A. O. HUME,

Secretary to the Government of India.